Hollow Building Tile Manual

for

Builders and Masons

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Construction Suggestions

Cement Stucco should not be applied in freezing weather.

Window frames of a size that will fit in without cutting the tile units should be used wherever possible.

Partly completed walls should be covered at night, particularly during bad weather, to protect the newly completed work against damage from rain, snow and frost.

Wood frames will shrink away from the masonry and therefore caulking while not necessary, is often advisable around doors and windows, particularly in exposed windy locations.

Hollow Tile should not be dumped from trucks or wagons. Each size of shape should be piled separately. Breakage will be avoided and a saving effected in the mason's time.

Tile should be so built in the wall that all open ends of the cells are sealed up to preserve the insulating value of the air spaces.

The large units in which Hollow Tile are made not only afford the simplest type of permanent construction, but permits of rapid building progress and considerable saving in both labor and mortar. Tile should be thoroughly wetted before placing when laid in dry weather.

Stucco cannot crack or come off a hollow tile wall once it has been properly applied. There is a genuine bond between these materials and any attempt to separate them will demonstrate this, as the line of cleavage will not fall in the joint between the two materials.

In laying up vertical web tile the masons or bricklayers should be instructed to butter the vertical joint surfaces of the tile but about ¾" to 1" in the center so that when laid in the wall through vertical mortar joints will be avoided as far as possible. This gives better insulation and prevents the passage of moisture by capillary attraction.

While in the majority of Hollow Tile residences the stucco and plaster plastering is applied directly to the tile wall, it is recommended, especially in northern parts of the country, that the tile be furred with tile or tile units. This adds to the insulation and overcomes any possible faulty construction causing dampness.

The proper use of Hollow Building Tile is not at all difficult, if a few simple rules are understood and put into practice. The method of bonding the walls at corners and around door and window openings and the maintaining of a proper break-joint bond throughout the wall, are easily mastered by anyone who can handle a trowel.

Medium or hard hollow building tile as a backing for stucco is ideal. It does not shrink nor swell, has a low absorption ratio, will not disintegrate, and has a surface that is both sufficiently rough and dense to insure the best bond between the two materials and it further is scored with horizontal grooves that provide the strongest possible mechanical bond. No. tile with absorption over 20% should be used on outside walls.

Estimating the quantity of tile required for a given building may be done roughly. It is only necessary to figure the square foot area of work to be done and multiply result by number of tile required to lay one square foot, adding for the area of lintels, copings and for other special work. In ordering the tile, however, the quantities of the various shapes required should be carefully figured and clearly specified. In figuring quantities, all openings in walls should be deducted.

The method of finishing walls should be settled before window frames are ordered. Stock window frames of the

sizes best adapted to fit the Hollow Tile units with the least amount of cutting and fitting should be used. All window frames for use in walls finished with stucco should have either the regular staff beads or a staff moulding to finish up against the stucco. Staff bead should be full depth of outside casing where recessed jamb tile are not used.

Things to Avoid

Don't forget to form drips under lintels and sills, also under belt courses or other projections.

Don't use flat or segmental arch lintels on wide openings and don't support arches on slender piers which do not provide the required abutment.

Don't permit your mason to break up a lot of tile for short pieces. It takes time and wastes material. Smaller shapes and the required quantity of fractional lengths should be specified when ordering the tile.

Don't run rafters for outside porch roofs through the tile wall; it is much more simple to bolt or anchor a wall plate to face of wall and nail the joist or rafter to such plate. Every hole tends to weaken the wall and also destroys the regular bonding.

All horizontal flat surfaces should be avoided in stucco work. Belt courses should be formed with a good wash or slope.

Don't cut holes in the tile wall for the support of joist; it is much more simple and infinitely better construction to properly build in pockets for joist.

Don't carry the stucco down to grade if it can be avoided; have a grade course of solid material at least 4" thick, brick, stone or good concrete, 6" or 1' above grade.

Don't permit haphazard back filling around tile foundations, as you do not want pockets for the accumulation of surface water next to your foundation, and you will probably want to do some planting around the building when finished. Careful back filling with good earth is always advisable.

Tools and Appliances Required

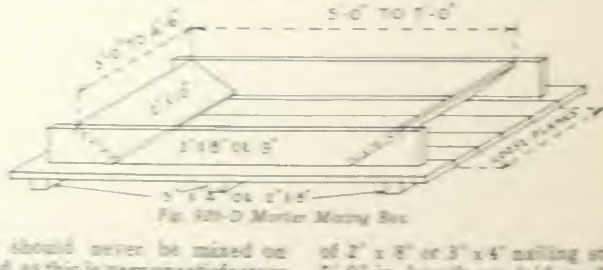


Fig. 920-D Mortar Mixing Box

Mortar should never be mixed on the ground, as this is very unsatisfactory and wasteful. A mortar mixing box should be made. Planks that are to be used in some part of the building can be temporarily utilized for this purpose. A good type of mortar box is shown in Figure 920-D. Three pieces of 2" x 8" or 3" x 4" nailing strips about 5'-0" in length are laid on the ground as a foundation and on these are laid a platform of 2" x 8", 9" or 10" plank about 5'-0" wide and 10'-0" or more in length. Only the two outside planks are nailed to the foundation to prevent spreading. The sides of

the box are then formed of 2" planks nailed together to form a box 3'-0" to 4'-6" in width and 5'-0" to 7'-0" in length, according to quantity of

Fig. 326-A Mortar Board

mortar mixed in a batch. For a small job, with only one or two masons working, the smaller size will be the most convenient and for a larger job the standard 4'-0" x 5'-6" box is best.

Mortar boards should be provided, one for each mason with one or two extra, so that helpers can have the

One or more water barrels should also be provided.

Mortar may be handled from the mixing platform to the work in wheelbarrows and be placed on mortar boards with a shovel the same as on large work, but in this manner building runways for the wheelbarrows, it is more frequently handled, on small work, in pails or buckets, as the amount of mortar required is small compared with other forms of masonry. A heavy galvanized iron or light weight wooden stable bucket should be used.

The scaffolding required is made of any 2" plank, 8", 9" or 10" in width, that may be available, placed on trestles. Several pairs of trestles should be made as shown in Figure 1111. The number required being determined by the number of masons employed rather than by the size of the job. Trestles 4'-0" in height are recommended in preference to the 5'-0" trestle, which is generally used

Fig. 1111 Trestle

boards set up and stocked with mortar ready for the masons when they move from one section of the wall to another. These mortar boards should be 3'-6" square as shown by Figure 326-A, made of 1" x 4" dressed square edge (not matched) boards on 2" x 4" battens.

for brickwork, on account of the heavier tile units which make the work above this height somewhat difficult. Also the 4'-6" trestle more evenly divides the average story height, hence additional planking for runways and a ladder will also be required.

One or more wheelbarrows for handling tile should be on hand.

A mortar hoe and a couple of standard square point shovels complete the equipment, except where a mortar wheelbarrow must be used to handle the mortar.

In addition to this equipment the following mason's tools will be required when the work is undertaken by anyone not having a brickmason's kit.

Brickmason's level.
Plumb line and pegs.
Mason's broad brick chisel.
Brickmason's hammer.
Chipped chisel or brick set.
Long pointed bricklayer's trowel with blade at least 10½" long.

In the laying of Hollow Clay Tile walls it is an advantage to have the masons work in pairs unless a handy man or helper can be constantly on hand so that it is not necessary for a mason to walk the full length of scaffold each time he wishes to raise the plumb line.

When a straight edge is required it should be made as shown by Figure 920-C. A straight edge will be necessary if cement floors are to be laid and is advisable for the leveling up of forms for concrete foundations, footings and similar work.

Fig. 920-C Straight Edge

Method of Estimating Quantities of Tile Required

Take the length of each outside wall in feet and multiply by the height in feet which will give the superficial area in square feet, and then deduct for all window and door openings. This will give the net area of each wall which, added together, will give the total net area of wall surface required.

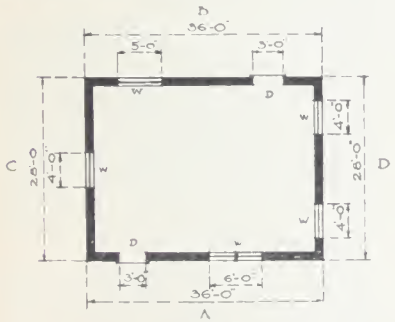


Fig. 981-A

In the illustrations Figs. 981 and 981-A, A and B are the same length and C and D are the same length, so we have:

		Sq. Ft.
Walls A and B	2 x 36'-0" x 14'-0"	1,008
Walls C and D	2 x 28'-0" x 14'-0"	784
Gables C and D	2 x 28'-0" x 5'-0"	280
	Total	2,072

Deductions for Windows and Doors

		Sq. Ft.
2 doors	3'-0" x 7'-0"	42
1 window	6'-0" x 5'-0"	30
1 window	5'-0" x 5'-0"	25
3 windows	4'-0" x 5'-0"	60
2 gable windows	3'-0" x 3'-0"	18
		175

Total net area in sq. ft. 1,897

1,897 sq. ft. equals the total net area or superficial square feet of all walls.

In order to convert this into the number of tile required we first determine the thickness of the wall and the size of tile desired.

Assuming 8x5x12 tile are to be used in an 8" wall side construction, we multiply 1,897 by 2.4, which equals 4,550 tile for the walls.

Fig. 981

Also, if 12 x 12 x 12 tile are to be used in a wall 12" thick end construction, we multiply 1,897 by 1 which equals 1,897, the number of tile required for tile courses 12" high.

TABLE SHOWING REQUIRED NUMBER OF TILE IN A SQUARE FOOT OF WALL AREA ALLOWING FOR AMPLE OVERAGE:

Sizes of Tile.	WALL THICKNESS						
	3 in.	4 in.	5 in.	6 in.	8 in.	10 in.	12 in.
3¾ x 5x12 Side const.	...	2.4	3.0	...	...	...	{2.4}
8 x 5x12 Side const.	...	...	1.5	...	2.2	...	{2.4}
3¾ x12x12 End const.	1.0	...	...	...	...	...	4.0
4 x12x12 End const.	...	1.0	...	...	...	...	3.0
6 x12x12 End const.	..	...	...	1.0	...	...	2.0
8 x12x12 End const.	...	...	...	...	1.0	...	1.5
10 x12x12 End const.	...	...	...	...	...	1.0	1.2
12 x12x12 End const.	...	...	...	...	...	...	1.0
8 x 6½x12 Side const. (Interlocking)	...	...	...	...	2.5	...	..
8½x10¼x12 Side const. (H-Shaped)	...	...	...	...	1.2	...	
8 x8x8 Cube	..	...	...	...	2.2	..	3.3

NOTE: A 12" wall side construction may be built up by bonding 3¾x5x12 and 8x5x12 tile together.

The Hollow Building Tile Association, Conway Building, Chicago

The quantity of corner, joist course, sill, lintel and jamb or closure tile, should be figured separately and deducted from the straight wall area.

If the tile units are to be laid on the side, closures and half-closures will be necessary at the jambs of all straight openings unless these are to be closed by filling the ends of the tile with concrete. Where recessed box window frames are used, jamb tile and half-jamb tile will be required.

Some form of tile will be required for bonding the corners in any event and also some form for providing a bearing surface for joists and some form of tile for lintels will be required except where the regular straight wall tile is used by filling with concrete and reinforcing them for lintels.

LINTELS

In determining the quantity of lintels required for window and door openings, we add together the length of each window and door opening, allowing at least 8" bearing on each side of these window and door openings for the lintel to rest upon.

8 doors	3'-0" wide + 1'-4"	8'-4"
1 window	4'-0" wide + 1'-4"	7'-4"
1 window	5'-0" wide + 1'-4"	6'-4"
3 windows	4'-0" wide + 1'-4"	15'-4"
2 windows	2'-0" wide + 1'-4"	6'-8"
	Total	44'-0"

44' represents the lineal feet of lintel setting required.

Compute also the lineal feet of sills from actual openings keeping door and window sills separate where a hollow tile sill is to be used. Frequently, however, the wood sill of window frames is set directly on the tile wall and no other shape provided or required for this purpose excepting where the tile are set on end. A course of tile sloh should be used under all frames to cap off and close the cells in the tile, when tile are laid with cells vertical.

SILLS

Door sills	8 x 8 =	5 lin. ft.
Window sills	1 x 8 =	4 " "
" "	1 x 8 =	5 " "
" "	3 x 8 =	15 " "
Outside window sills	8 x 8 =	6 " "
	Total	35 lin. ft.

35' represents the lineal feet of sill section required.

The vertical lineal feet of jamb for all plain openings is figured for closures and vertical lineal feet of recessed box frame openings for jamb tile.

Where straight wall tile is used for regular lintels, the item for regular lintels is disregarded, otherwise, this item would be deducted at an equivalent area in square feet.

Window and door sills, if included, should be deducted at ½ square foot each. Area of jambs to be deducted by averaging the jambs and half-jambs to equal ¾ foot per lineal foot. Closures and half-closures should be similarly averaged. Corner tile will be equivalent to ½ to 1½ square feet per lineal foot. Joist course is usually taken to equal one square foot per lineal foot.

NOTE: When the corner tile are different from the regular wall tile and are to be deducted, the ends and end are to be measured. Fig. 114 on page 22 deduct ½ sq. ft. Fig. 109 deduct 1.5 sq. ft. Fig. 101 deduct 1.66 sq. ft. Fig. 114 deduct .8 sq. ft. and add one 2 x 8 x 12 tile per lin. ft. of corner.

These items for the house shown on our sketch will be as follows:

Window and door lintels	44 lin. ft.	= 44
Door sills	5 " "	= 5
Window sills	9½ " "	= 14
Jamb	67 " "	= 46
Closures	50 " "	= 31
Corners (4 x 14)	56 " "	= 56
Joist course (2 x 36)	72 " "	= 72
	Total	=267

Thus we shall have approximately 267 square feet to deduct if all these items were to be provided for, giving the reduced area of straight wall 10x at 1897 minus 267 = 1,630, multiplied by 2.4 = 3,936 pieces.

Now then, our completed quantities will be:

3,936	pcs. of wall tile
44	lin. ft. lintel
5	" " door sills
14	" " window sills
46	" " jambs
31	" " closures
56	" " corners
72	" " joist tile

Standard Shapes of Tile for Side Construction

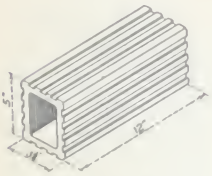


Fig. 877-A
Weight, 9 lbs.

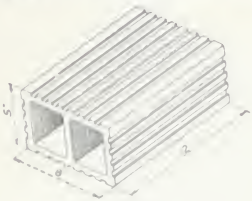


Fig. 877
Weight, 16 lbs.

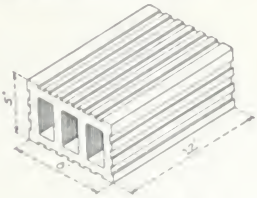


Fig. 1018
Weight, 16 lbs.

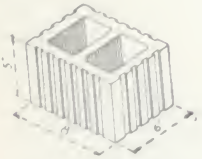


Fig. 948-A
Half-Closure Tile

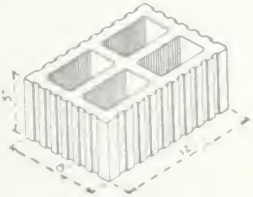


Fig. 948
Closure Tile

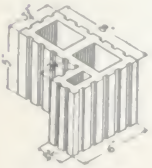


Fig. 949-A
Half-Jamb Tile

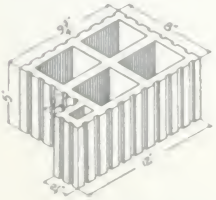


Fig. 949
Jamb Tile

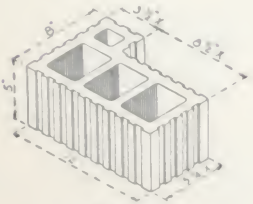


Fig. 950
Special Corner Tile

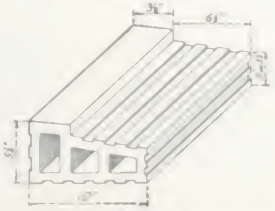


Fig. 906
Sill Tile for both End and Side Construction

The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.

Standard Shapes of Tile for End Construction

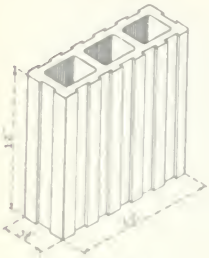


Fig. 1019-A
Weight 20 lbs.

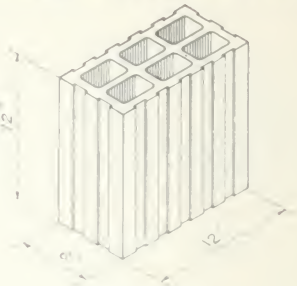


Figure 884-C
Weight, 30 lbs.

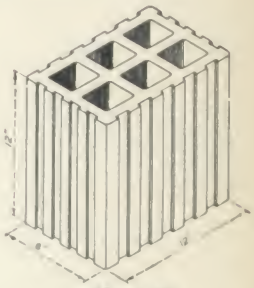


Figure 880
Weight, 36 lbs.

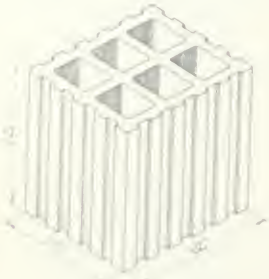


Figure 1021
Weight, 42 lbs.

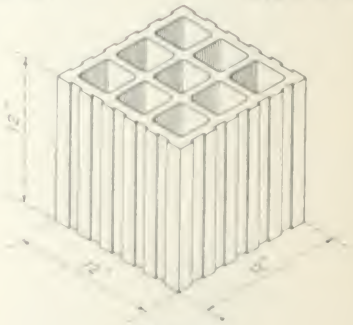


Figure 1023
Weight, 52 lbs.

Fig. 938
Jamb Tile

Fig. 939
Half-Jamb Tile.

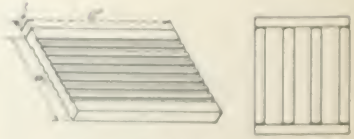
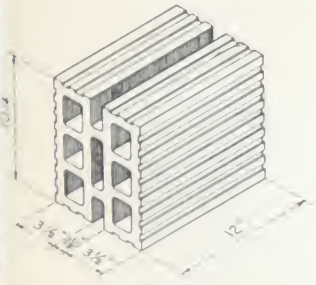


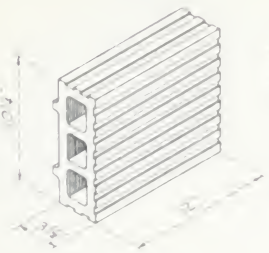
Fig. 928
1' Slabs. Showing form in which they are usually made. A tap on the corner separates the tile into slabs. Made in required wall widths up to 12'

The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.

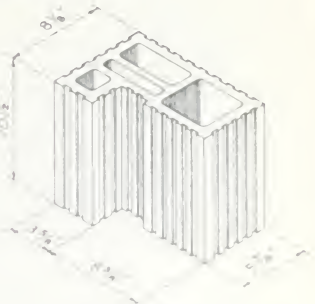
Standard H-Shaped Tile



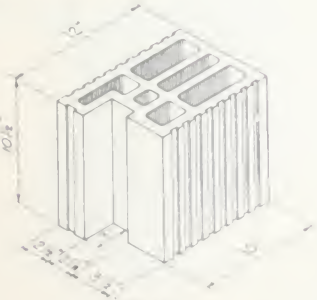
No. 47
Weight 32 lbs.



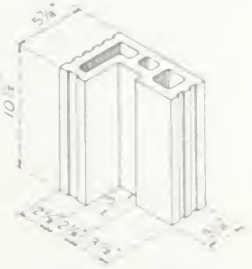
No. 47-F



No. 47-C



No. 47-J



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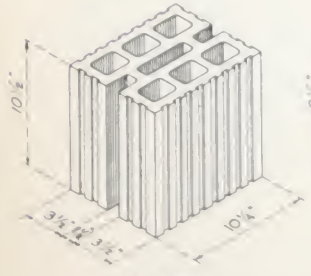

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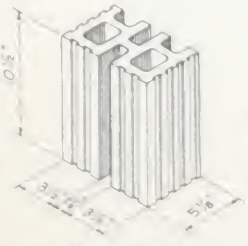

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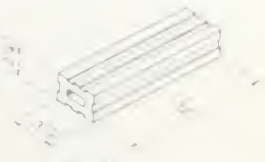
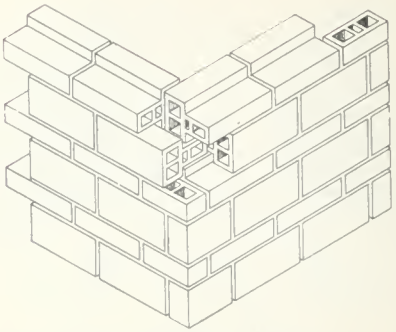


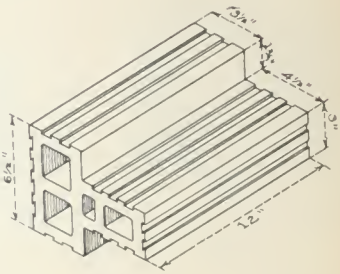
No. 11

No. 47 is the Standard unit. No. 35 and No. 23 is made similar to No. 47 except the heights, which are 7⅝" and 5" respectively, each with its complement of special shapes such as jambs, corners, etc.

Standard Interlocking Tile

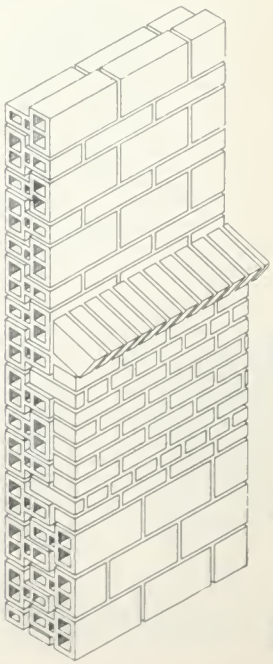


Corner Construction 8" Walls.
Note: Corner tile omitted in upper part wall to show bonding.



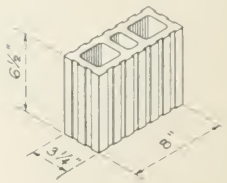
Interlocking Tile—Figure 1569
Weight, 16 lbs.

Same tile builds walls any thickness. This is 8-inch wall.



Every mortar joint interrupted by air pocket which prevents conduction of heat, cold or moisture.

12-inch wall built of the same tile.



Corner Tile—Figure 1569-C

Facea with Brick

Tile left exposed

A full complement of interlocking shapes such as starters, jambs, etc., are furnished by all manufacturers of this shape.

Standard Shapes of Partition or Floor Tile

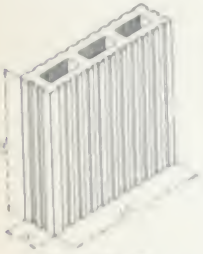


Fig. 1019-C
Weight, 15 lbs.

Fig. 1022-A
Weight, 16 lbs.

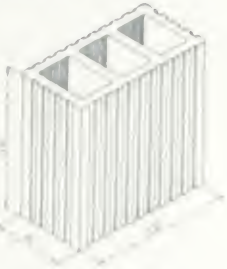


Fig. 1019-D
Weight, 22 lbs.

Fig. 1020
Weight, 30 lbs.

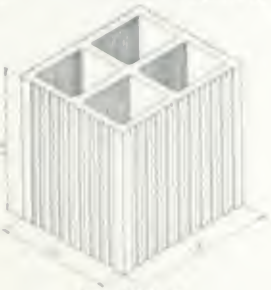


Fig. 1019-E
Weight, 36 lbs.

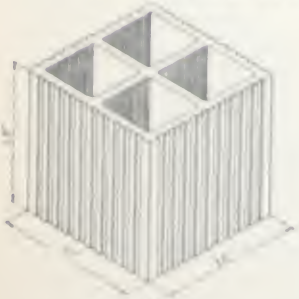


Fig. 1019-F
Weight, 40 lbs.

The following special sizes can be furnished by some manufacturers:
5x12x12, 3 cell, weight 20 lbs.
7x12x12, 3 cell, weight 25 lbs.
9x12x12, 4 cell, weight 33 lbs.

Split Furring Tile

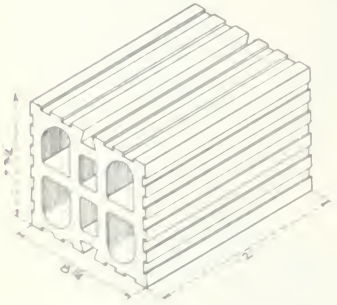
Before Separation

3x12x12
Weight,
9 lbs.

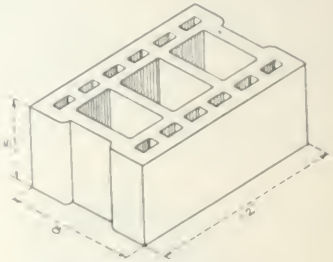
After Separation

The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.

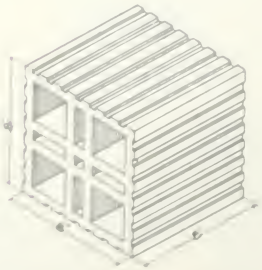
Standard Shapes of Hollow Building Tile



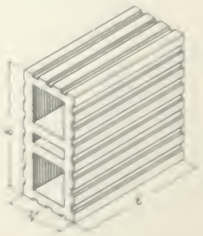
Heavy Duty Tile—Figure 1571
Weight 24 lbs.



Double Shell Tile—Figure 1570



Heath Cube—Figure 1608
Weight, 18 lbs



Half-Cube—Figure 1608-A

The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.

Cement Mortar

Hollow Clay Tile should be set with cement mortar composed by measure of one part Portland cement to not more than three parts clean sharp sand, to which may be added hydrated lime not exceeding 15% by measure of the cement.

Note:—The percentage of lime added is always figured on the quantity of the cement used, therefore 15 per cent is equal to about one-sixth part by measure of the cement.

The lime specified is not needed to make the mortar stronger, but to make it more plastic and easier to handle. Mortar containing lime will adhere better to the tile, makes a neater job and results in a saving in labor. Too much lime must not be used as it weakens the mortar. A straight lime mortar, however rich the mixture, is not suitable for setting Hollow Tile.

Sand containing any loam must not be used for cement plastering or stucco.

Sand containing a very little clay may be used if the grains are not coated. However to insure good workmanship sand should be free from loam or clay.

QUANTITIES OF MATERIALS REQUIRED FOR CEMENT MORTAR

(1 Part Cement — 3 Sand — 15% Hydrated Lime)

for Laying 1000 Pieces of Hollow Tile

Barrel of Cement Specified to be 3.8 cu. ft.

Size of Tile	Thickness of Wall	Position Laid	Cu. Ft. Mortar	Part Cement Bags	Sand Cu. Yd.	Hydrated Lime Bags
Partition Tile						
3x12x12	3"	End or Side	18.7	4.2	0.69	75
4x12x12	4" &	End or Side	22.2	7.4	0.82	99
6x12x12	6"	End or Side	22.2	7.4	0.82	99
Load Bearing Tile						
3½x12x12	3½"	End or Side	21.4	7.1	0.80	96
6x12x12	6"	Side	30.0	10.0	1.11	1.35
6x12x12	6"	End	26.0	8.7	0.96	1.08
8x12x12	8"	Side	37.5	12.4	1.40	1.67
8x12x12	8"	End	33.3	11.1	1.23	1.33
10x12x12	10"	Side	40.3	13.4	1.49	1.81
10x12x12	10"	End	37.3	11.1	1.23	1.33
12x12x12	12"	Side	52.8	17.6	1.96	2.11
12x12x12	12"	End	37.1	12.4	1.38	1.48
3½x8x12	3½"	Side	17.8	5.9	0.66	0.70
8x8x12	8"	Side	33.4	11.1	1.24	1.33
8x12x12 "D. S."	8"	End	33.3	11.1	1.24	1.33
8x8½x12 "I"	8"	Side	33.3	11.1	1.23	1.33
8x10½x12 "H"	8"	Side	39.8	13.3	1.48	1.59
8x8x8 "Cube"	8"	Side	30.3	9.9	0.98	1.08

Note: Mortar required for 16" to thicker wall may be obtained by adding the quantities necessary for tile which are used to make the required thickness.

The method used in computing the above table in general is as follows:

All joints are assumed to be ½" thick.

For tile not on the side, the mortar covers the entire horizontal or bed joints and ½" each for the outer and inner vertical joints on end of tile.

For tile not on end, the longitudinal shells and webs or bars ½" width of mortar on the horizontal or bed joints, no mortar on the cross shells and webs and ½-inch on vertical joints on both inside and outside on 4" tile and 8" double shell tile.

On the 8", 10", and 12" all tile the vertical joints are 3" on both inside and outside. This leaves an air space of 5", 4" and 6" in these vertical joint joints.

A barrel of hydrated lime containing approximately 3 cubic feet, weighing 150 pounds net, will produce about 4 to 4.5 cubic feet lime paste which, on account of water added will weigh about 70 pounds per cubic foot.

NOTE: In giving size of tile, the first number always indicates the thickness of wall, the second the width of tile, and the third the length to which it is cut.

A cubic foot of hydrated lime weighs 40 pounds.

A cubic foot of cement weighs 100 pounds.

Therefore at 15% there will be 6 pounds of hydrated lime to add to each cubic foot of cement.

The Hollow Building Tile Association, Conway Building, Chicago

Cement Stucco

Mortar for exterior cement stucco or cement plastering should first be mixed dry. Spread the sand in a layer about 4 inches thick and dump the quantity of cement required on top of the sand and thoroughly mix the two materials dry until a uniform color is obtained; then add two-thirds of the quantity of water required and again mix, adding water as required to any dry spots, to obtain a uniform mass of proper consistency. Only sufficient water to produce a workable consistency shall be used. A slight excess quantity of water is better than too little; but too much will make the mortar thin and more difficult to handle and retard the setting somewhat, especially in damp or cold weather. Retempering by the addition of water shall not be permitted.

When dry hydrated lime is used in cement mortar it should be added with the cement and mixed in dry before water is added.

Hollow Tile walls should be thoroughly cleaned from dust, dirt and mortar, and thoroughly moistened with water immediately preceding application of the stucco.

Wood lintels over wall openings shall not be allowed. Wood shrinks and will cause cracks in the stucco finish.

Cement plastering should be kept moist and protected from the sun, wind and frost until it has thoroughly hardened. Each coat shall be kept moist by sprinkling for at least three days following its application. If the air is very dry or the sun shines on the stucco it is advisable to protect the stucco while setting with sheets of burlap kept damp by sprinkling at intervals. If the surface is worked too much with a "float" or trowel, bringing a lot of cement to the surface, it is apt to develop hair cracks or shrinkage cracks. To prevent this it is better to finish the surface with a felt polisher, if a reasonably smooth surface is desired, or with a wood, cork or carpet covered float for all ordinary purposes.

Stucco shall not be applied when the temperature is below 32° Fahrenheit, unless protected against freezing.

Two coat stucco work is all that is necessary on hollow tile walls. First coat a brown coat, and second coat a finish coat. This is a saving in both labor and material over other forms of construction.

MATERIALS FOR 100 SQUARE FEET OF CEMENT MORTAR FOR STUCCO

Thickness in Inches	1:3½		1:3		1:3½	
	Cement, Sacks	Sand, Cu. Feet	Cement, Sacks	Sand, Cu. Feet	Cement, Sacks	Sand, Cu. Feet
½	1 7	4 2	1 5	4 4	1 3	4 6
¾	2 5	6 3	2 3	6 6	1 9	6 9
1	3 4	8 4	3 0	8 8	2 6	9 2
1¼	4 3	10 5	3 7	11 0	3 3	11 5
1½	5 1	12 6	4 5	13 2	3 8	13 7

These quantities may vary 10% in either direction due to the character of the sand and its moisture content. No allowance is made for waste.

If hydrated lime is used (20% by volume of cement) decrease these quantities 12½.

A three gallon (12 quart) bucket holds about 40 pounds cement and about 16 pounds dry hydrated lime, or about 25 to 30 pounds of lump lime paste.

If sand is measured by wheelbarrows, the quantity of an average barrow load for the particular type of barrow used should be measured by making a box to hold exactly 1 cubic foot.

Laying Out the Building

When laying out Hollow Tile buildings which are to be stuccoed, the thickness of the stucco, $^3/_4$″ or more must be taken into consideration. All door and window openings should be made at least $^3/_4$″ larger on all sides and the face of the tile walls to be stuccoed should be set back $^3/_4$″ or more. Foundations should therefore be made 2″ longer than the Hollow Tile wall and rough tile door and window openings should be made 2″ wider than the desired finished size of openings, or back to back dimensions of the outside staff beads on window frames.

For residences where 2″ x 8″ joist with double floors are to be used, and where joists are not spaced close enough to permit the direct application of lath to underside of the joists, particularly when double floors are used, it is customary to cross-fur the ceiling with 1″ x 2″ strips laid either 12″ or 16″ center to center. The lath and plaster require an allowance of about $1^1/_2$″ for ceiling thickness or a total floor thickness of about 11″.

Thus approximately one foot is added for floor thickness to the given clear story heights, and the number of courses required is indicated by Fig. 935, page 16. One-half inch mortar joints are assumed.

Story heights and courses for barns and hog houses would be figured the same as a basement or cellar story as indicated by Figures 929-E and 935, page 16, adding the depth required for the foundation wall below grade line.

When foundations as well as the wall above grade is built of Hollow Tile, the Hollow Tile should be figured as follows:

For height of ceiling	8′-6″ or 9′-0″
Add for depth of foundation (3′-0″ below grade and 6″ above)	3′-6″
Height of wall above footings 8′-6″+3′-6″ or 9′0″+3′6″	12′-0″ or 12′-6″
For the 8′-6″ ceiling height:	
For 5″ tile this requires 26 courses at 5½″ or	11′-11″
For 12″ tile this requires 11½ courses at 12½″ or	12′-0″
For the 9′ ceiling height:	
For 5″ tile this requires 27 courses at 5⅓ or	12′-4½″
For 12″ tile this requires 12 courses at 12½″ or	12′-6″

Should the foundation for these buildings be built of concrete it is customary to extend the concrete wall about 6″ or 8″ above the floor line as shown by Fig. 935, page 16, which indicates the number of courses required for dairy barn walls.

For the standard load-bearing tile that are made to be set with the cells vertical in the wall and which for each thickness of wall have a 12″ x 12″ face for 12″ courses, it is quite customary to make the usual one-half inch allowance for the horizontal bed joints, but this is hardly sufficient in ordinary work and five-eighths inch is safer, giving some leeway in the leveling up of courses where there is a little variation in the size of the tile.

With this form of tile, the wall should be capped off at each story level with a course of tile slabs to give a proper bearing for the joist and for the tile forming the joist course in wall, and also to close up the cells and cut off the circulation of air within the cells at each story level. For the tile slab course a full 1½″ should be allowed. Half length tile referred to as "half cuts," or brick if slabs are not available should be used where required to work out the story heights.

Fig. 930, page 16, indicates the number of courses required for various story heights where the 12″ x 12″ load bearing tile is used. Basement or cellar stories are figured in a similar manner.

When figuring height of upper stories the 2″ thickness of roof plate must be allowed for.

Should the slab courses at story

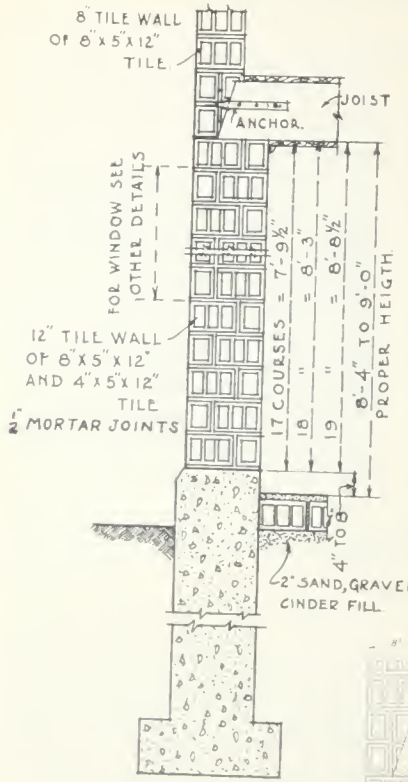


Fig. 935

Section through basement and foundation wall showing method of figuring story heights when building a 12" tile wall, using 8 x 5 x 12 tile and 4 x 5 x 12 tile, side construction.

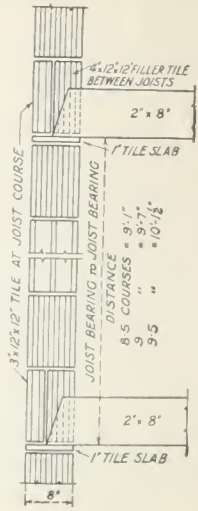


Fig. 930

Method of figuring story heights so as to use full blocks without cutting, using 8 x 12 x 12 tile, end construction and ⅝" mortar joints.

Fig. 929-E

Method of figuring basement heights so as to work in full blocks without cutting, using 8 x 5 x 12 tile, side construction.

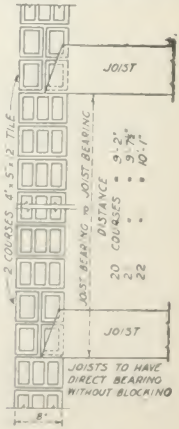


Fig. 929-D

Method of figuring story heights so as to use full blocks without cutting, using 8 x 5 x 12 tile, side construction.

levels not be used with the 12″ x 12″ face vertical cell tile, the method of figuring story heights is the same, except that allowance for slab course is omitted in figuring height of the tile and joints and the clear height for a given number of courses would therefore be about 1½″ less than the figures already given. In such cases, however, the joist should be given a full bearing by resting on a half brick. This raises the floor level about 2″ in relation to the tile courses and allowance for this difference should also be made when clear story heights are figured.

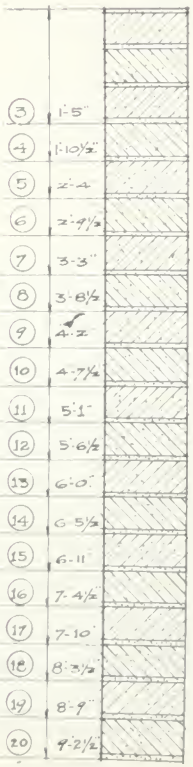
In laying out the story height for cellars where a portion of the wall is to be above grade line, it is generally advisable to consider the relationship between normal grade line and top of footing and provide for cellar window frames of a size that will fit in with the courses of Hollow Tile and have sills above grade, unless areaways are to be used around these windows.

A simple and accurate method of squaring all corners of a building when laying out wall lines is to drive stakes in the approximate location of the lines (batter boards being more serviceable than individual stakes) and using what is known as the 6-8-10 rule. By this rule is meant measuring from the exact intersection of the wall lines six feet along one proposed wall and eight feet along the other proposed wall forming a triangle, two sides of which will be six feet and eight feet respectively and the diagonal line connecting these ends, the hypothenuse should be ten feet when the corners are square.

Fig. 967

The illustration above shows the workman in the foreground using a ten-foot rod as the hypothenuse of the triangle and the workman in the background adjusting the line either to the right or left to form a perfectly square corner.

½" MORTAR JOINTS



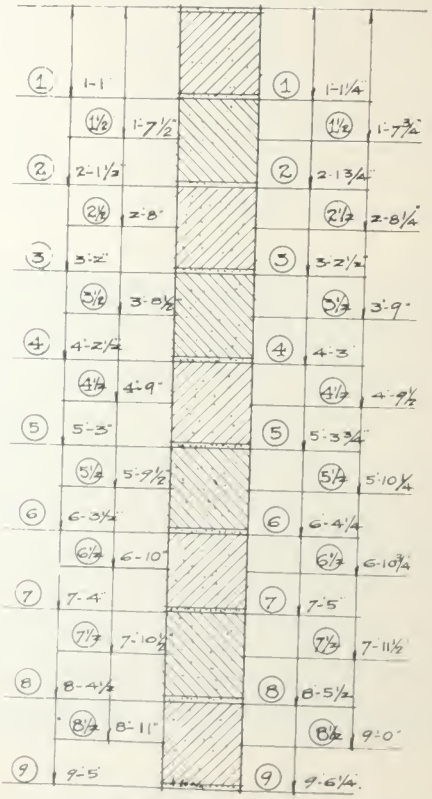
5" COURSES
FOR 8"x5"x12" TILE.
FOR 4"x5"x12" TILE.

Fig. 201-A

Table showing clear heights of openings in hollow tile walls for both side and end construction using 5" courses.

½" MORTAR JOINTS

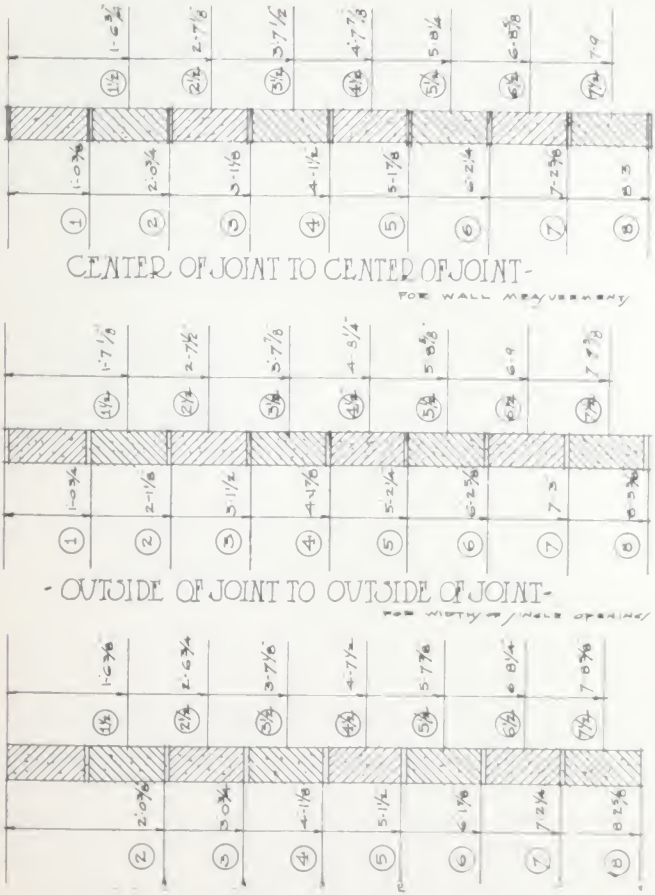
⅝" MORTAR JOINTS



12" COURSES
FOR 12"x12" TILE OF
ANY THICKNESS.

Fig. 201

Table showing clear heights of openings in hollow tile walls for both side and end construction using 12" courses.



OUTSIDE OF PIER TO OUTSIDE OF PIER
BASED ON 1/2" MORTAR JOINTS

Fig 203

Table showing widths for openings, piers, etc., for both side and end construction tile units.

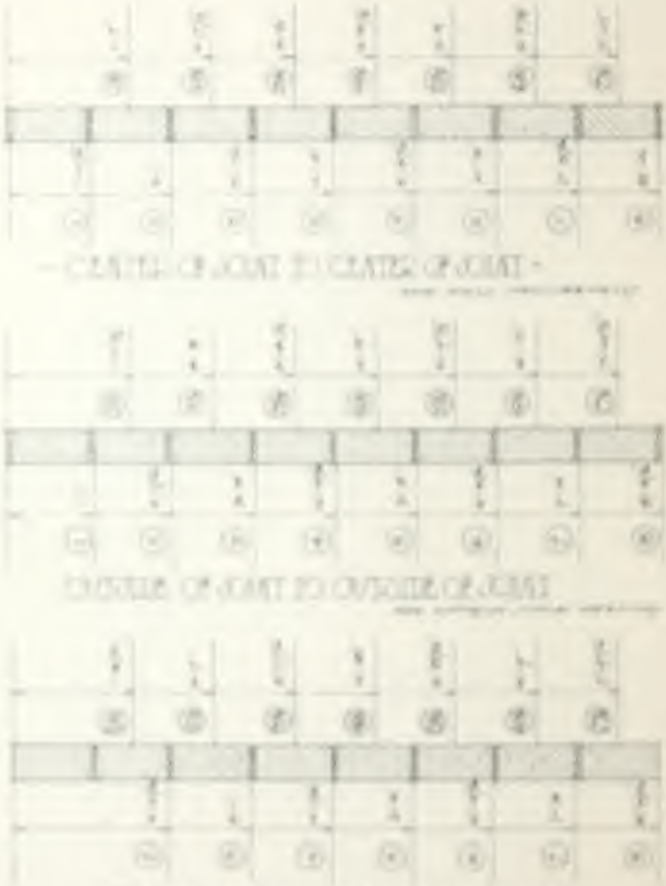


Fig. [illegible]

Table showing widths for openings, piers, etc., for both side wall and party construction (for walls

Bonding of Walls

The placing of openings for doors and windows in Hollow Tile walls and the details for bonding walls at corners and around openings is naturally divided as follows:

First: Walls that are to be stuccoed or otherwise veneered and for which the breaking of joints between courses is required only for strength.

Second: Walls built entirely of Hollow Tile and for which the bond is required for strength and appearance.

Generally a smooth or texture face tile is used for farm buildings, placing such buildings under the second classification. The ordinary rough structural tile is generally used for farm homes finished with stucco, but when rough tile are used for barns, hog houses, and other buildings, they are usually left exposed.

There is no valid objection to the use of ordinary scored building tile for all rough or unfinished structure, providing the tile is of the hard burned variety having a low absorption value not exceeding 16% and preferably has little or very shallow scoring on the faces.

Any bonding that gives suitable strength to the wall will meet the requirements of veneered walls. Only bonds which combine uniformity of courses between openings, conforming to and aligning with the running bond throughout the balance of the wall will generally be considered satisfactory for exposed tile walls. For this reason a 6" running bond is usually preferred, having the joints between the tile in one course occur midway over a tile in the course below.

A very pleasing effect may often be obtained with the smaller tile units by using a 4" running bond, or breaking joints one-third the length of the tile, but on account of the bonding around windows, this is not generally recommended.

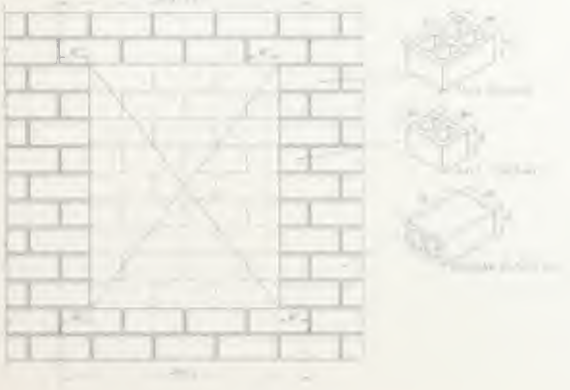


Fig 117

Method of allowing for closures and half-closures in connection with window and door openings to secure proper bonding in the wall

It will be noted from the accompanying details that the 6″ bond has a decided advantage as it simplifies the working up to and bonding around openings. In any wall in which a finished jamb or reveal is required at openings, it is customary to use two shapes or sizes of tile, one the full 12″ length and the other a short or half length to accommodate the running bond of wall courses. These are referred to as "full closures" and "half closures" where the end face gives a straight reveal, or "full jambs" and "half jambs" when the end face is rabbitted to form a recessed reveal, to provide for box window frames. Typical "jamb" and "closure" tile for an 8″ thick wall built with 8 x 5 x 12 building tile are shown on page 7.

Naturally these shapes must be made to some standard length and as the full jambs and closures are made to conform to the standard length of the regular building tile, the short jambs and closures are accordingly made half the length less one fourth inch to allow for thickness of vertical mortar joint. These sizes therefore call for a 6″ running bond in the wall courses.

The advantage of this bond is seen in the illustration Fig. 117, page 21, which shows an opening in a wall which has the vertical joints between tile in alternate courses evenly staggered with a 6″ running bond. It will be noted that only two shapes are required to work up to the opening, the full and half length tile, also that the sill and lintel will have an even projection and bearing each side of opening.

It is very seldom that the layout of openings and courses in ordinary buildings cannot be arranged to conform to the even arrangement shown in Fig. 117, by adopting sizes for the door and window frames which will conform to multiples of full or full and half length tile with allowance for joints as already noted. This gives intervals of 6¼″ in width for determining openings.

Details for the various corner bonds for 4, 5 and 8 inch walls are given on the following pages.

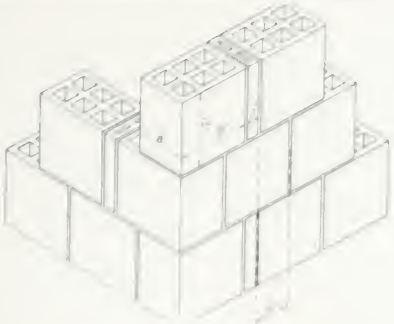


Fig. 114
End Construction 8" Wall
This makes a uniform bond to be used for exposed walls

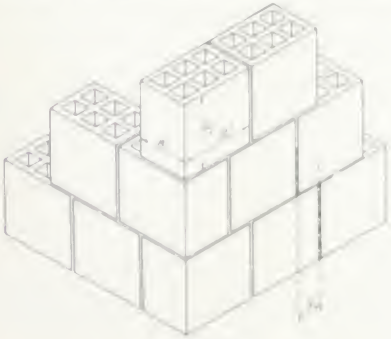


Fig. 113
End Construction 8" Wall
The usual method of bonding corners when wall is to be stuccoed

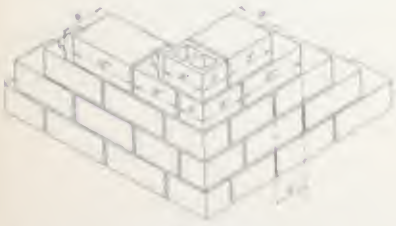


Fig. 101
Corner bonds for 8" wall side construction.

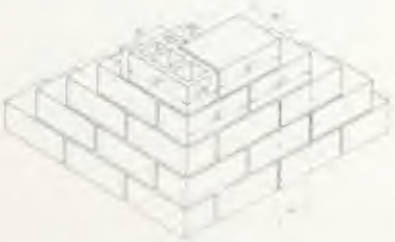


Fig. 102
Corner bonds for 8" wall side construction using special corner tile.

Fig. 110

Usual method of bonding corners of 12" wall for cavity construction where wall is to be stuccoed.

Fig. 111

Use of 8" headers to make every fourth course where wall is to be stuccoed.

Fig. 112

Usual method of bonding corners where wall is to be stuccoed.

Fig. 113

Use of 8" headers to make every fourth course where wall is to be stuccoed.

Fig. 114

Usual method of bonding 8" walls at corners where wall is to be stuccoed.

Fig. 115

Use of 12" headers to make every fourth course where wall is to be stuccoed.

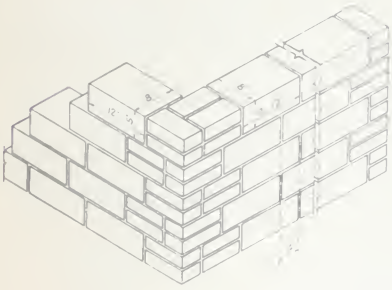


Fig. 103

Common brick used for corners and openings on side construction 8" wall.

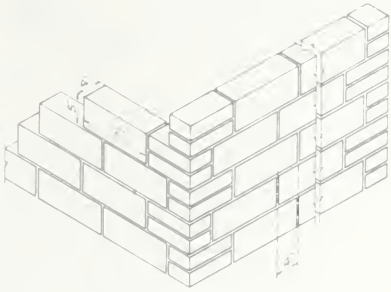


Fig. 112

Common brick used for corners and openings on side construction 4" wall.

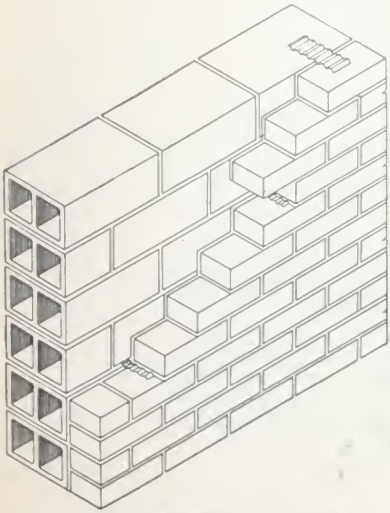


Fig. 952

8" tile wall side construction with brick facing.

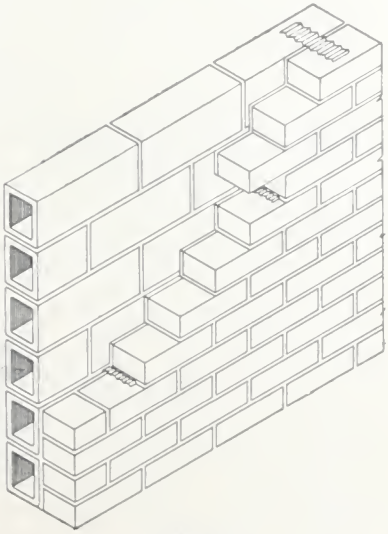


Fig. 955

4" tile wall side construction with brick facing.

Bonding with metal ties is recommended only for light structures.

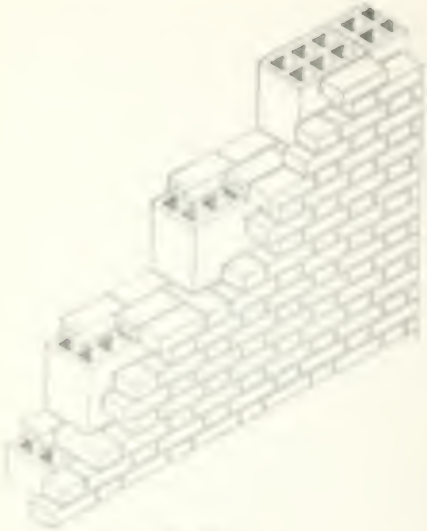


Fig. 141

Shows an 8" tile wall with stud construction, tile cut to bond with brick veneer. Flemish bond with brick headers every 6th course.

Fig. 142A

Shows an 8" tile wall, side construction, with Flemish bond veneer. Full headers occur to every fifth and sixth course.

Hollow Tile Foundations

For small or moderate sized residences, garages, stores, and similar buildings, Hollow Tile foundation walls should be used. They have ample strength and are in every way satisfactory. Hard tile with not over 8 per cent absorption should be used for foundations and basement floors and walls. This type of foundation wall gives a drier basement or cellar than the average wall of solid masonry of the same thickness. Hollow Tile foundation walls have been found perfectly dry even in ground that was more or less saturated.

When the foundation walls are built in an occasionally saturated soil, the exterior face should be plastered with a water-proofed coat of cement mortar or asphalt to insure sealing up any small openings in the mortar joints.

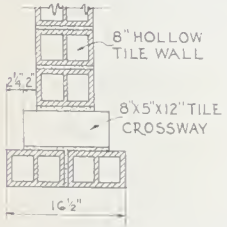


Fig. 915-A

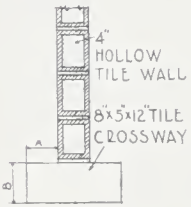


Fig. 915-B

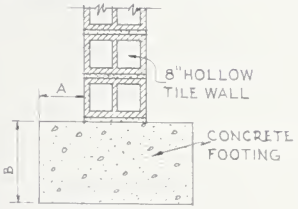


Fig. 915-C

Footings

Footings under the walls of residences, garages and other light structures may be built of Hollow Tile as noted above.

Suggested forms of construction for footings are shown by Figures 915-A, B and C.

For the hog house, poultry house, or small private garage, there is nothing better than hard burned Hollow Clay Tile and for the moderate sized house this material is equally advantageous for footings.

Such footings afford natural drainage under the foundation, are easy to lay, can be built upon immediately, have ample strength and when properly laid always insure a dry interior.

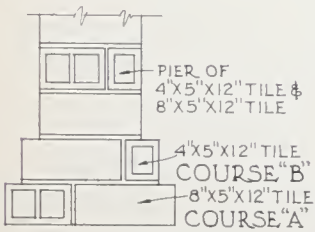
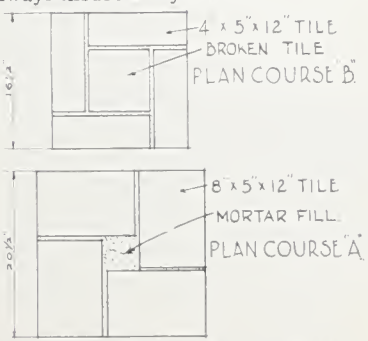
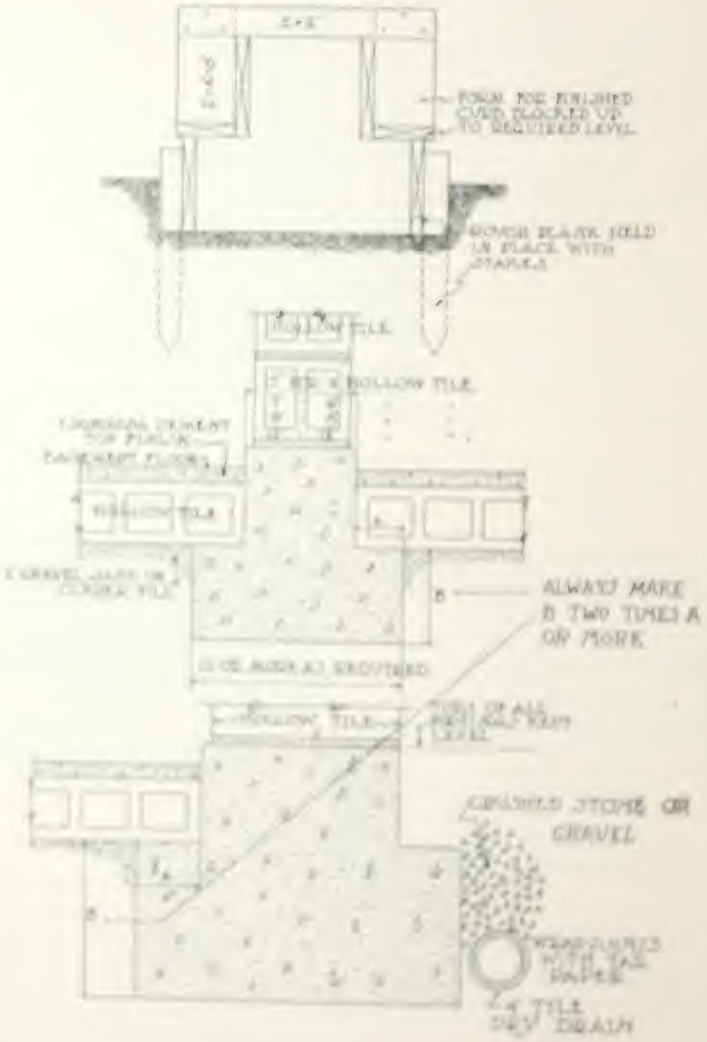


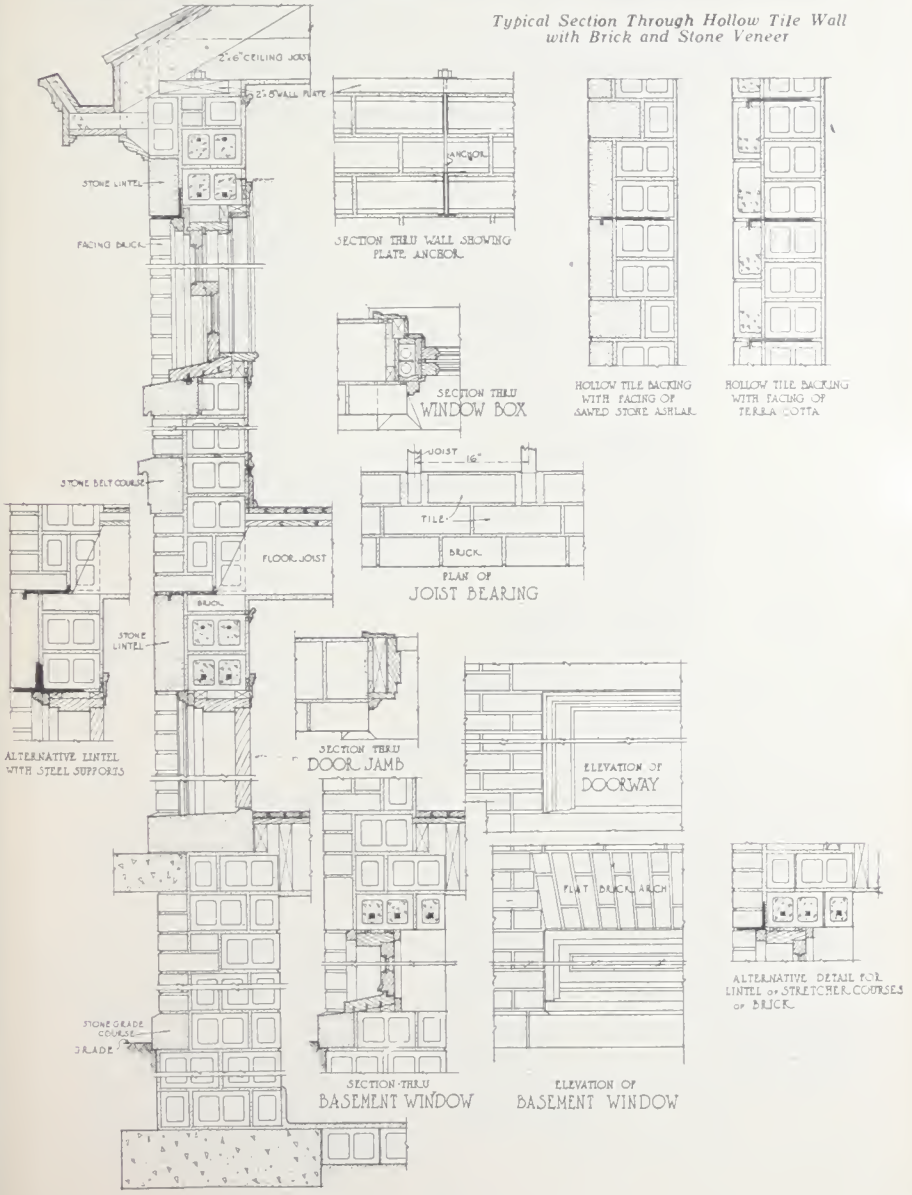
Fig. 919
Elevation of a pier using 4 x 5 x 12 tile and 8 x 5 x 12 tile.



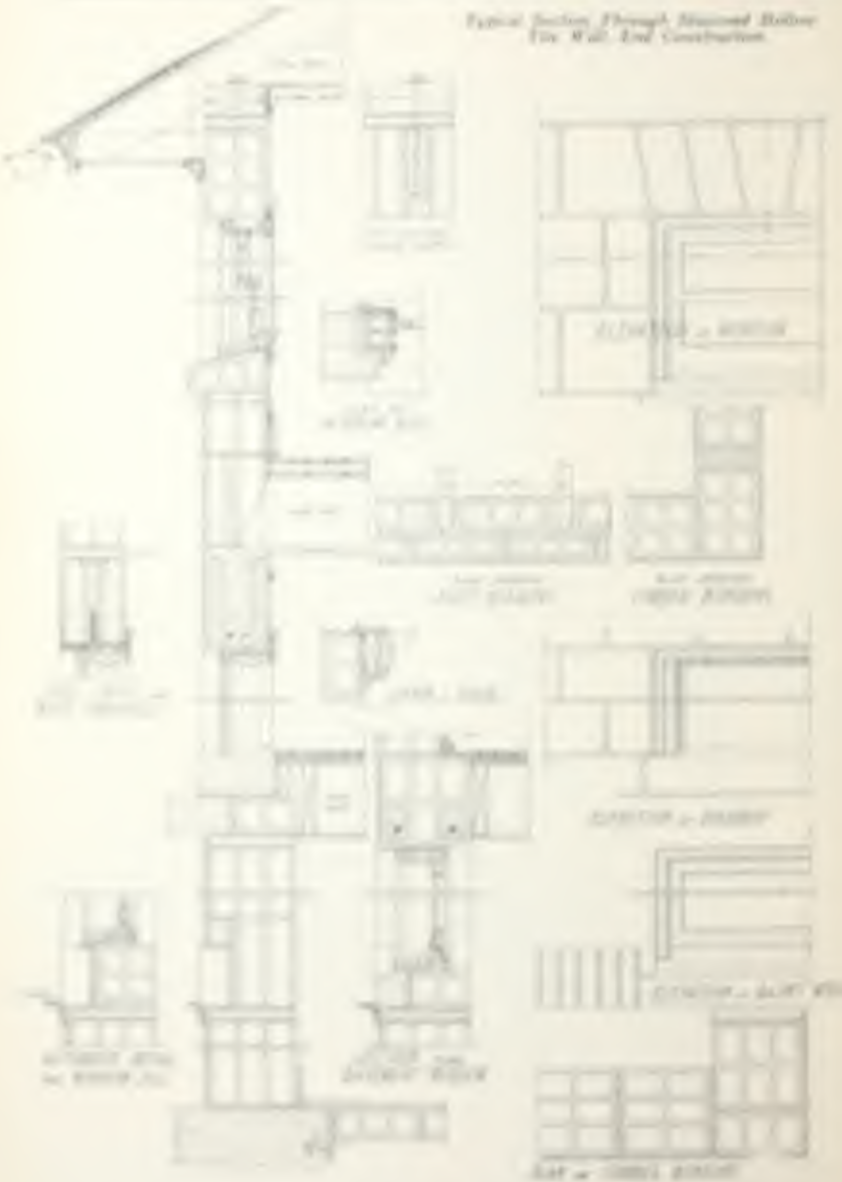
Plan of course A and B showing method of laying to secure a good bond.

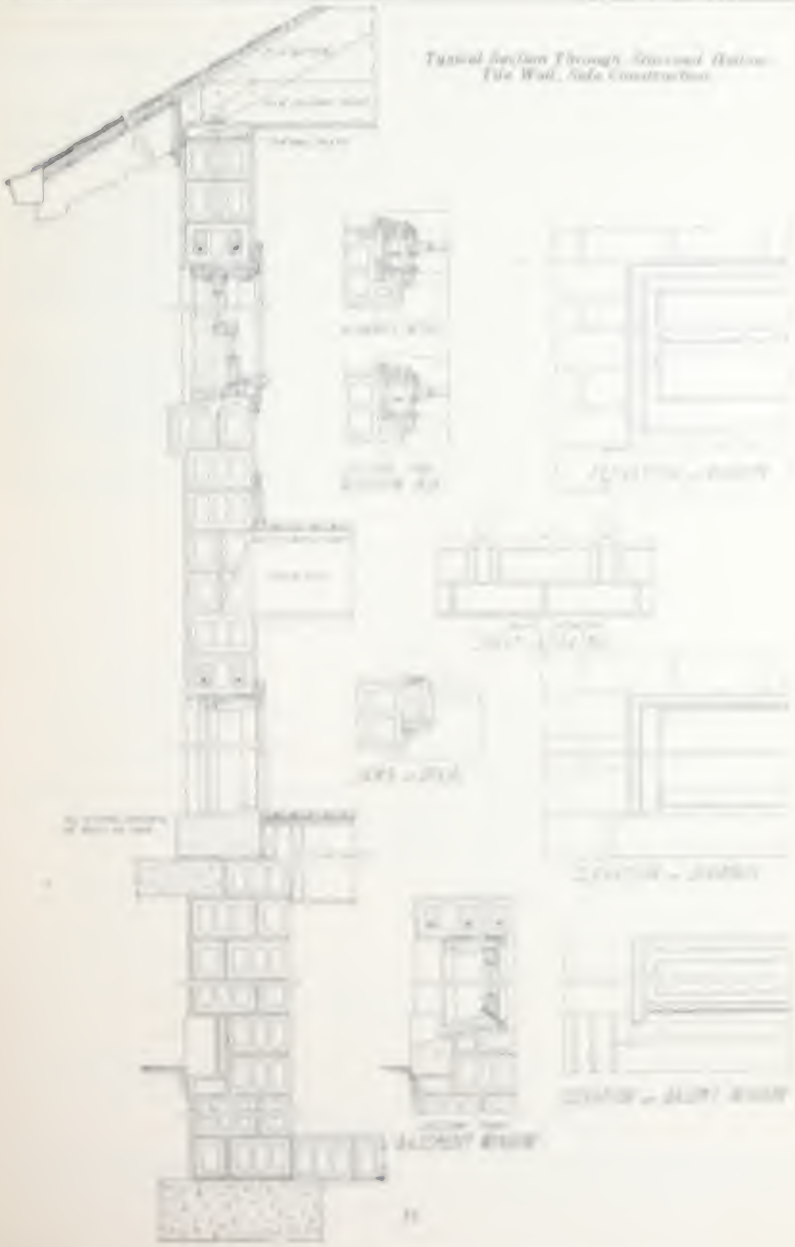

FORM FOR FINISHED CURB BLOCKED UP TO REQUIRED LEVEL
SUBGRADE
HOLLOW TILE
ALWAYS MAKE B TWO TIMES A OR MORE
CRUSHED STONE OR GRAVEL

Typical Section Through Hollow Tile Wall with Brick and Stone Veneer



Typical Section Through Stairwell Shelter
Fire Wall End Construction





Typical Section Through Stuccoed Hollow Tile Wall, Side Construction

Wall Thickness

For the larger and more pretentious home a 12" foundation and first story wall is generally used with an 8" wall for the second and attic stories. An all 12" wall is recommended because it is more stable, better weather resisting, and affords greater insurance against moisture affecting the plaster.

The average thickness of wall for small or moderate size houses, when built of 1 allow Tile is 8"; this is sufficient for ordinary requirements.

The minimum thickness that should be used for a dairy barn in the lower part or cow barn is 12". Where the tile walls are carried up to enclose the hay mow, the upper story may be an 8" wall as soon as where proper bracing is afforded. Plan for bracing of roof plate for plank frame roof construction on story and a half barns which has the Hollow Tile walls carried up several feet above the hay mow floor is shown by Fig. 935.

Small general purpose barns frequently have Hollow Tile walls 8" in thickness in the lower story but where dairy cattle are to be kept the 12" thickness is much better.

The better type of hog house, particularly in the cold northern section of the country should have 8" thick tile walls, the insulation of the double air cells being desirable, but are frequently built with 8" walls of the 8 x 6 x 12 tile set on edge.

Poultry houses, generally have walls 4" or 8" in thickness which is ample for this kind of building. Small garages, implement sheds and pump houses also may be built with walls, 4", 8" or 8" in thickness.

Dairy houses generally should have a wall 8" thick.

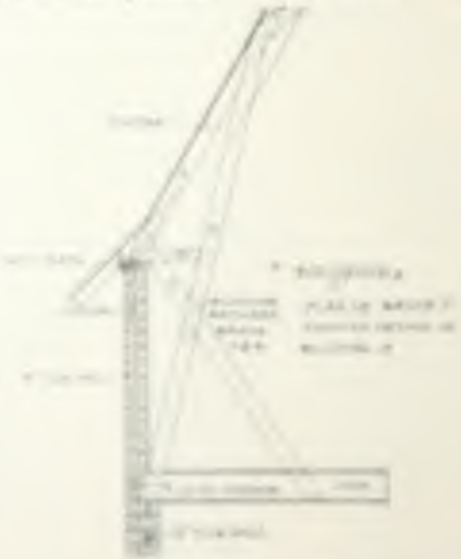


Fig. 934

A practical method of laying rafters and floor joist together. These timbers will enhance the upper portion of walls against outward thrust from the roof.

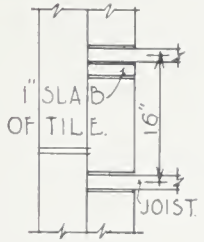
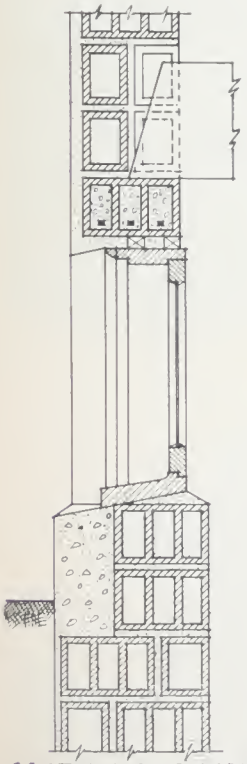
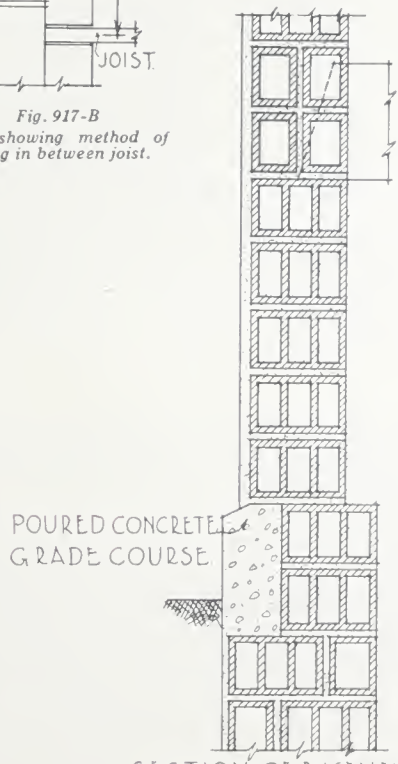


Fig. 917-B
Plan showing method of filling in between joist.



SECTION OF BASEMENT
WALL AT WINDOW.

Fig. 917-A
Section through basement window showing method of building window sill. Side construction.



SECTION OF BASEMENT
WALL BETWEEN WINDOWS

Fig. 917
Section through basement wall showing method of building water-table course. Side construction.

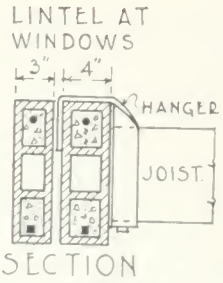


Fig. 977-A
Section through window or door lintels showing the use of joist hangers.

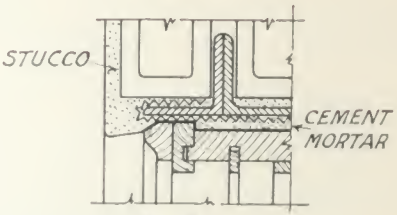


Fig. 978-A
Section through lintel showing steel support.

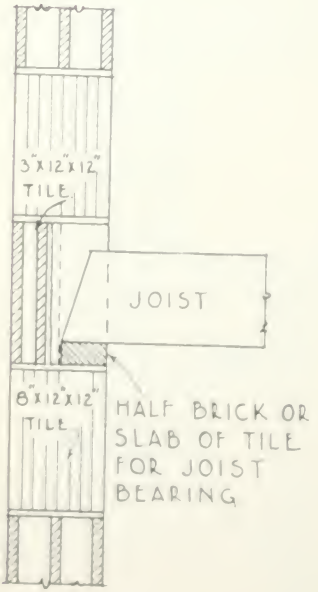


Fig. 977
Section through wall showing joist bearing on 8" end construction tile wall without slab course.

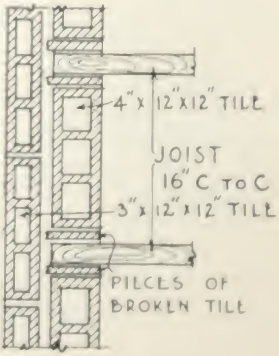


Fig. 977-B
Plan through wall showing fillers or blocking between joist.

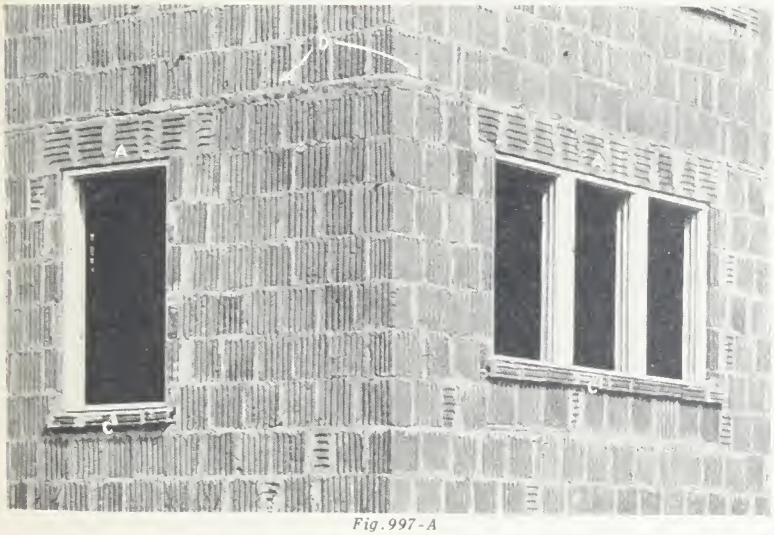


Fig. 997-A

Detail at corner of Hollow Tile Wall showing (A) both ordinary and wide reinforced lintels over single and triple windows. Hollow Tile sills (C) and Tile slab course (D) forming joist bearing for the floor above in walls of end construction.

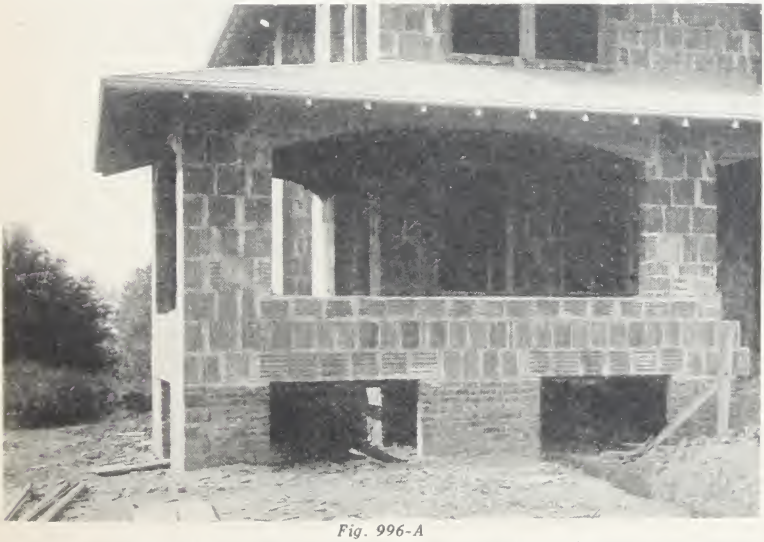


Fig. 996-A

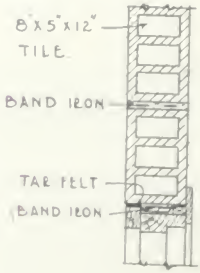
Showing porch built of Hollow Tile on brick pier foundation.

Simple Tile Lintels

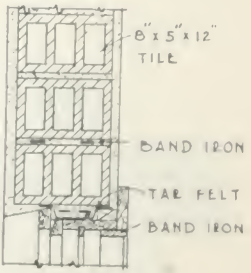
Hollow Tile walls for garages, poultry houses, in fact for any minor farm building or other simple structures in which the window openings are small and the walls frequently only 4″, 5″ or 6″ in thickness, may be built without specially reinforced lintels, if the wall is reinforced by band iron bedded in the joints over window and door openings. This band iron reinforcement should be placed in two joints; in the one immediately over the wood frame, and in the joints above the first course of tile over the frame. Band iron should be well bedded in the cement mortar joints throughout its length and extend for at least 18″ on each side of the opening. Band iron reinforcing should be from No. 16 gauge up to $\frac{1}{8}$″ in thickness and $\frac{3}{4}$″ to 1″ in width.

Several lines of heavy soft-steel wire (No. 4, 6 or 8 gauge) in each joint may be used in similar manner, or the regular woven wire reinforcement may be used.

Whenever cement mortar or concrete is placed directly on top of the wood frame as required in this form of lintel construction, a strip of tar paper should be placed over top of frame to prevent absorption of moisture from the mortar or concrete and the probable swelling or warping of the frame.



"A"
8"x5"x12" TILE
SET ON EDGE



"B"
8"x5"x12" TILE
SET ON SIDE

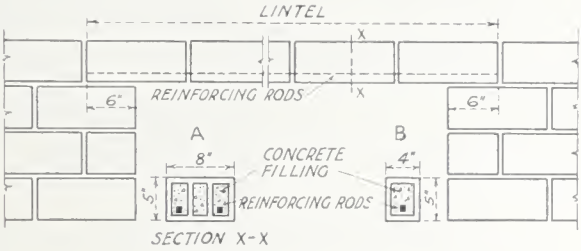


Fig. 910

Construction of a hollow tile lintel with the use of concrete and reinforcing steel on tile courses 5" high.

"A" shows section through an 8" wall.

"B" shows section through a 4" wall.

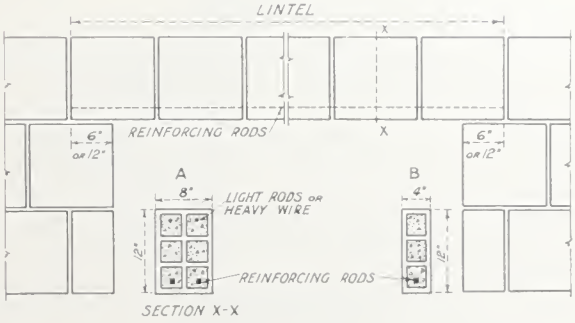


Fig. 911

Method of reinforcing a hollow tile lintel for "A", an 8" wall, and "B", a 4" wall, using end or side construction with courses 12" high.

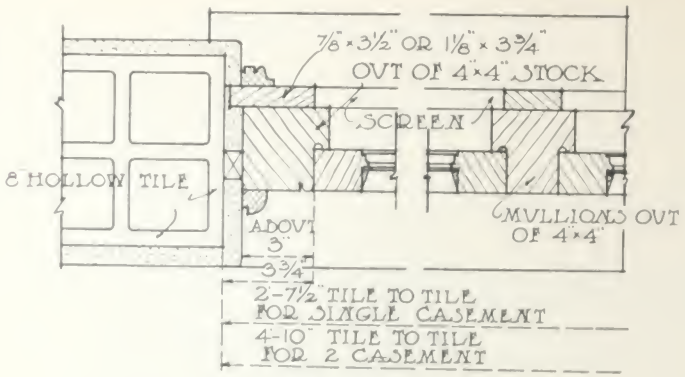
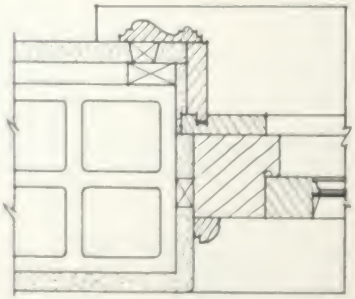


Fig. 988

Detail of outswinging casement sash in moulded plank frame.



ALTERNATE FOR FINISHED JAMB & TRIM.

Fig. 988-A

Alternate detail of outswinging casement sash for finished jamb and trim.

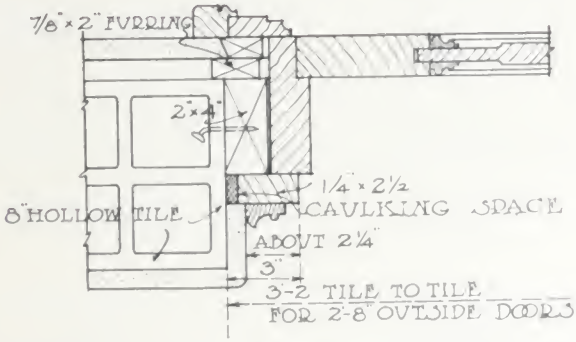


Fig. 991

Typical door frame detail with hollow tile walls, using rough pine bucks for all exterior doors.

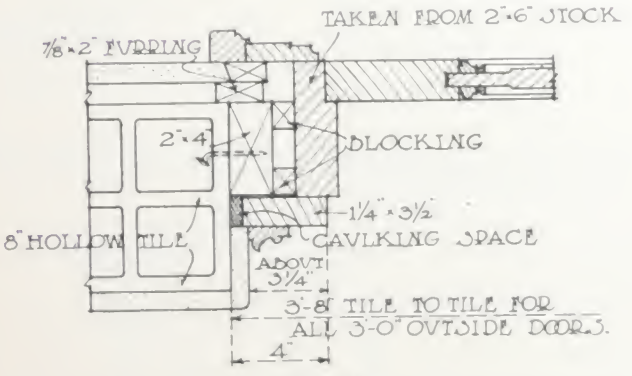


Fig. 991-A

Typical door frame detail with hollow tile walls showing method of obtaining larger door openings.

Fig. 990-1
Typical detail of double hung window and jamb, the wall plaster finish returned back to frame and metal header trim.

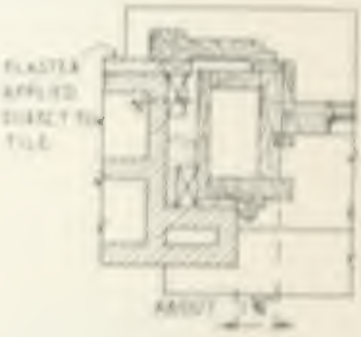


Fig. 990-2
Typical detail of double hung gradient box jamb tile without plaster finish and with header trim.

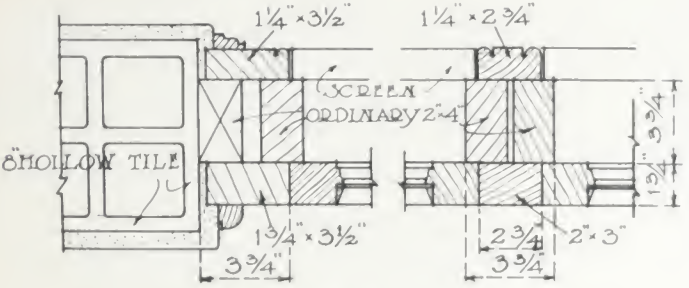


Fig. 989

Typical detail of outswinging casement sash in frames of 2" x 4" studs.

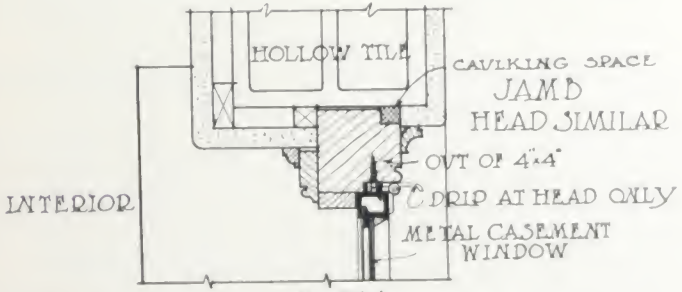


Fig. 992-A

Typical detail of jamb and head showing method of setting metal casement in wood frame for residence.

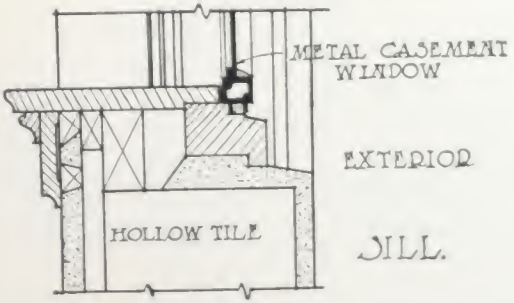
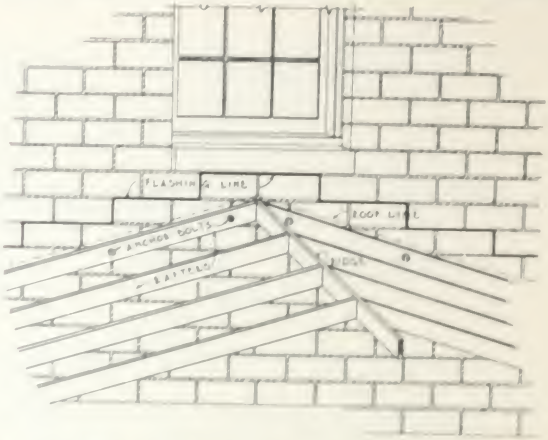


Fig. 992

Typical detail of sill showing method of setting metal casement in wood frame for residence.

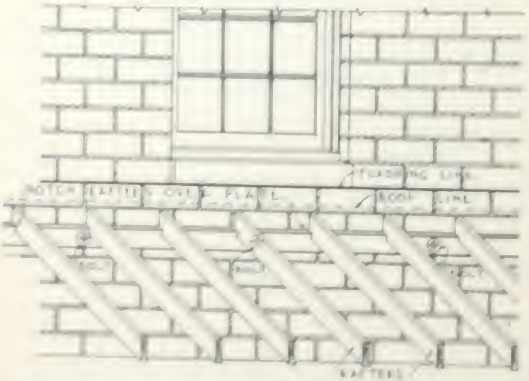
SECTION THRU WALL

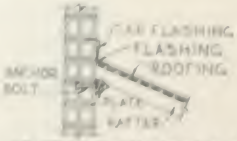
Fig. 941



Method of Attaching Porch or Shed Roofs Against Hollow Tile Walls

Note carefully the method of attaching wood porches and similar additions to Hollow Tile walls. Bolts or anchors are built into the wall and when wall is completed nailing strip is fastened to face of the wall and the roof or other wood members spiked to these nailing pieces as shown by Figs. 940 and 941. This method is superior to the building of rafters or porch joist into the Hollow Tile walls. Ordinarily ¾", ⅝", or ½" bolts are used and are built in as the wall is erected. When the bolts are put in after wall is completed a toggle bolt is used if placed in the end joints of tile or an expansion bolt if placed in the side bed joints, as shown by Figure 942, page 43.





SECTION THRU WALL

Fig. 940

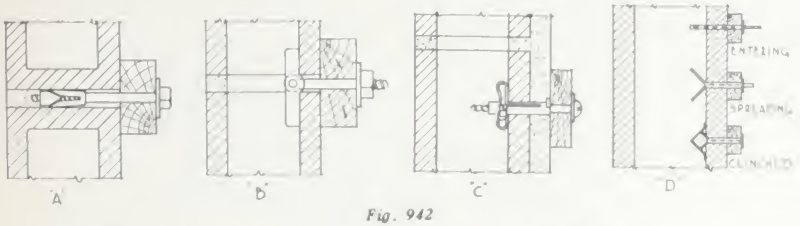
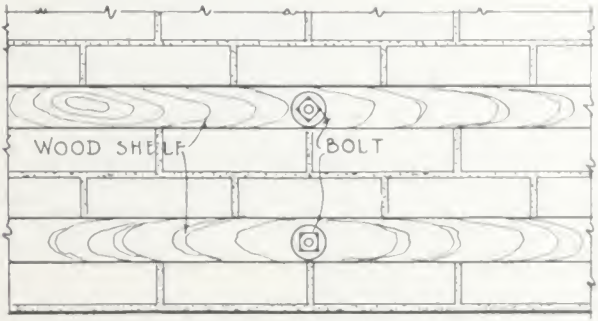


Fig. 942

(A) Typical Expansion Bolt.
(B) Typical Toggle Bolt.
(C) Collapsible Steel Screw Socket.
(D) Self-clinching Nail.



ELEVATION

Fig. 956

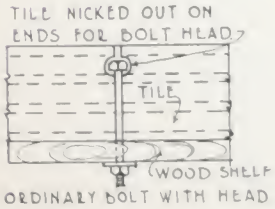


Fig. 956-A

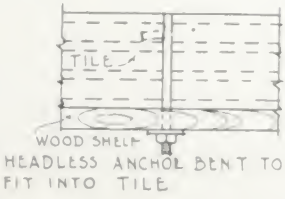


Fig. 956-B

Elevation and plans illustrating method of fastening shelves to hollow tile walls by means of headless anchors or ordinary machine bolts.

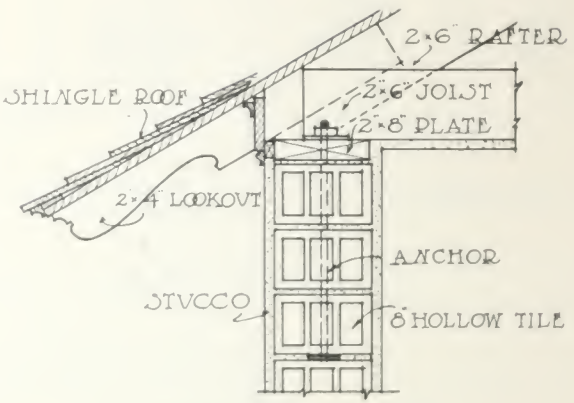


Fig. 961
Typical side construction at eave.

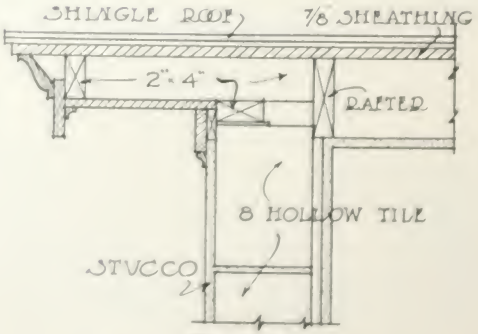


Fig. 961-A
Typical end construction at gable.

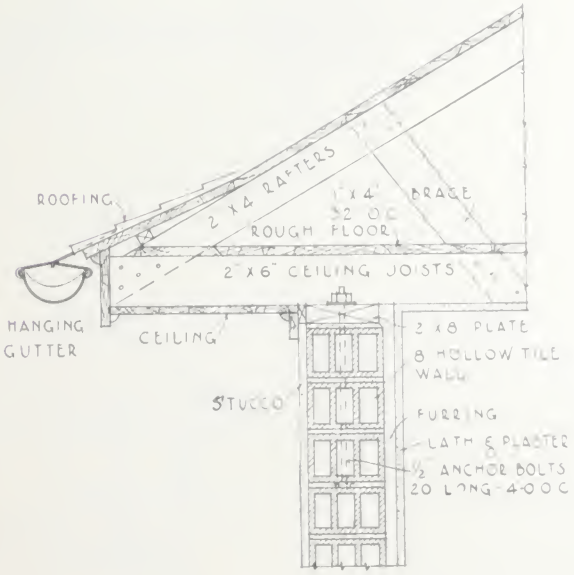


Fig. 882

Roof detail and eave construction in connection with side construction hollow tile.

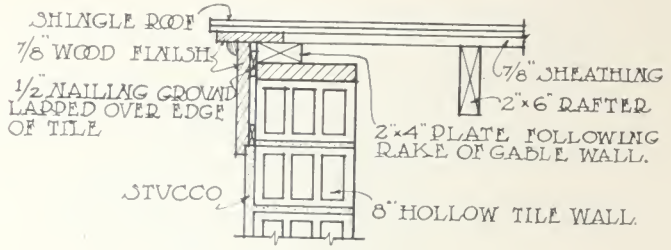


Fig. 962

Typical side construction with flush gable.

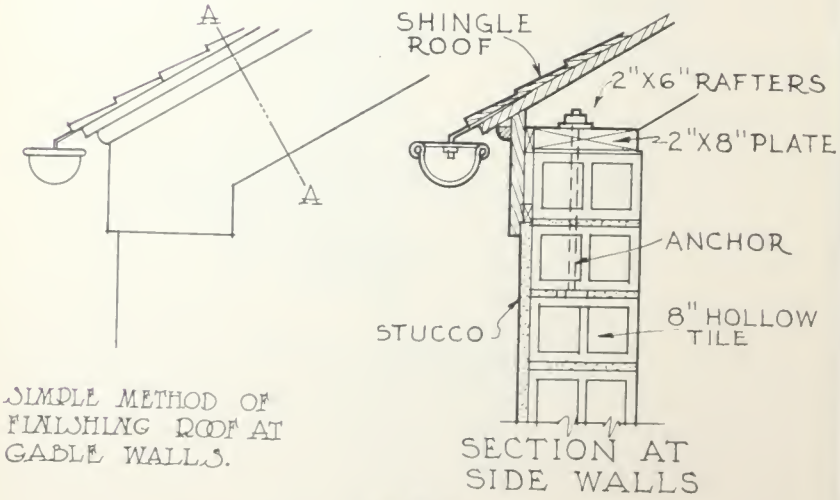
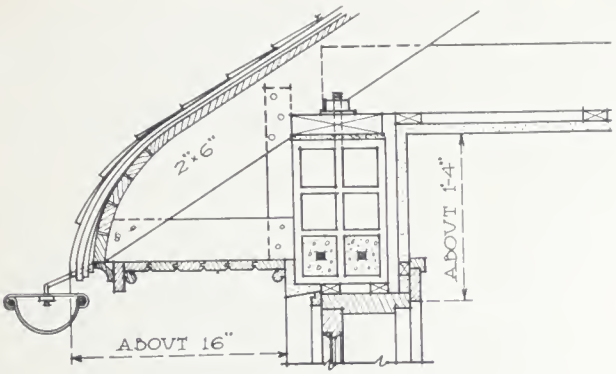


Fig. 962-A

Typical side construction with flush eave.



SECTION AT EAVES

Fig. 964
Shingle thatched roof effect on hollow tile building.

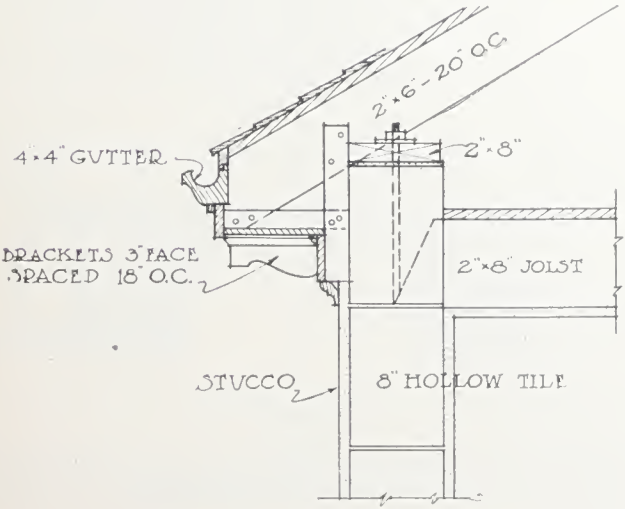


Fig. 963
Typical end construction with Colonial eave

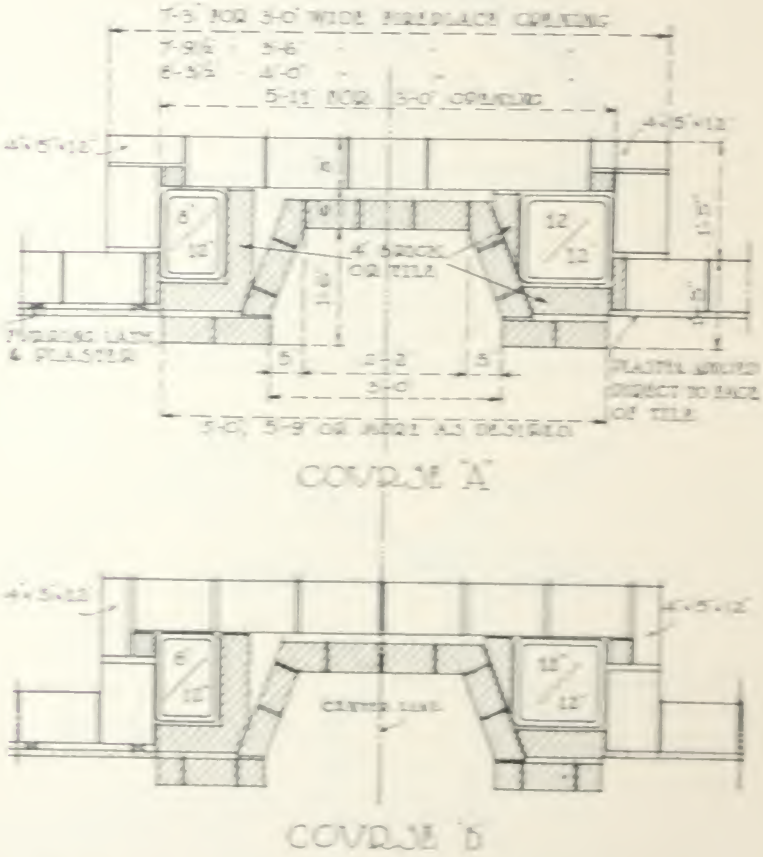


Fig. 102

Fireplace with side flues from furnace and fire boarding stoves set flush on inside in wall of 6 x 12 x 12 tile tube construction.

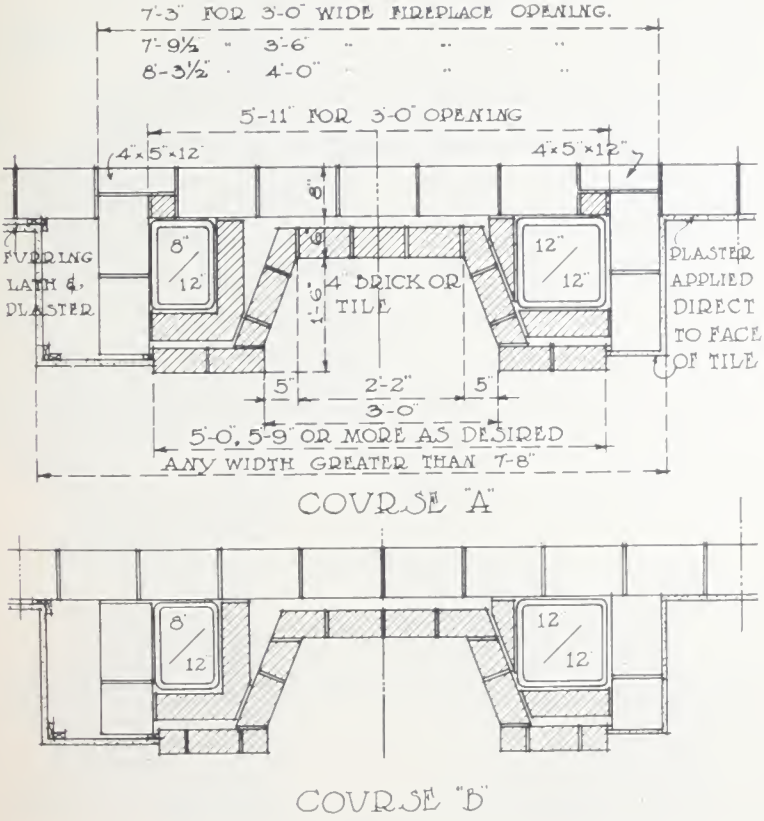


Fig. 971

Fireplace with side flues for furnace and for laundry and kitchen stoves set flush on outside in walls of 8 x 5 x 12 tile side construction.

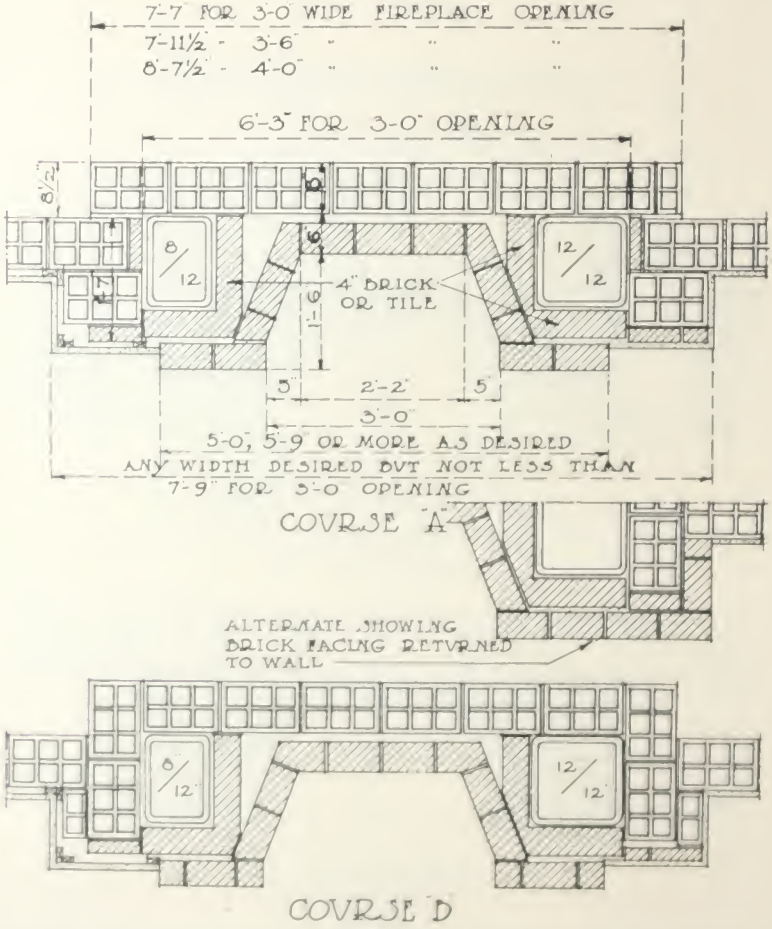


Fig. 976

Fireplace with side flues from furnace and for laundry and kitchen stove set midway in wall of 8 x 12 x 12 tile, end construction.

Chimneys

Chimneys should always be built on a solid foundation resting on earth well below the frost line, 2′-6″ to 3′-0″ in northern part of the U. S. at level of the building footing, whether they are interior or exterior chimneys. They should not be corbelled out as a projection from a wall and the top of chimney should be carried up to at least 3′-0″ above flat roofs and 2′-0″ above ridge of peak roofs.

Footing for chimneys should be at least 6″ or 8″ wider all around than the chimney foundation and for small chimneys should be 12″ wider all around. All chimney flues should have a uniform 8″ tile enclosing wall from the top of fireplaces (which may have greater thickness) to roof.

Only cement mortar should be used in the erection of chimneys, or a cement lime mortar in which the Portland cement used equals at least 50% of the cementing material.

All chimneys must be lined their entire height with fire clay flue lining, using care to break joints with the Hollow Tile.

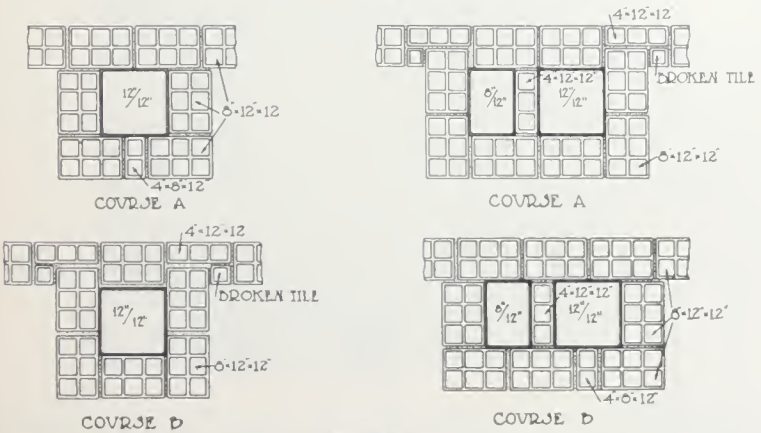


Fig. 1000

Detail of bonding wall in end construction for single and double flues.

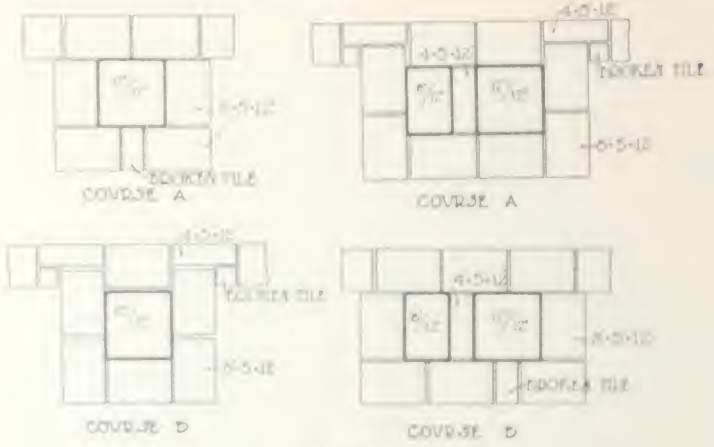


Fig. 999

Detail of bonding wall in side construction for single and double flues.

Fig. 999-A

Showing wall built of 8 x 5 x 12 Hollow Building Tile trimmed with brick belt courses, panels and window framing. Stucco will finish flush with the face of brick which projects approximately 1" from face of tile.

Fig. 982

Method of bonding pilasters into walls in end construction.

Fig. 983

Method of bonding pilasters into walls using side construction. Care must be exercised to completely fill the exposed air cells in the pilaster projection beyond the face of the wall.

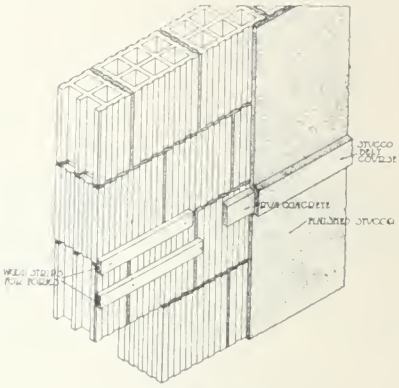


Fig. 995

Correct method of building belt course in end construction.

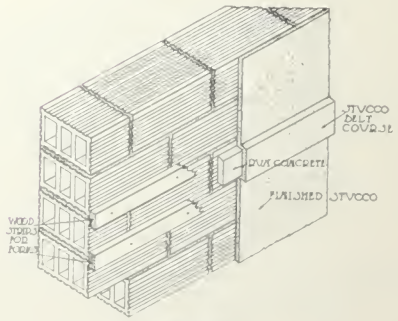


Fig. 997

Correct method of building belt course in side construction.

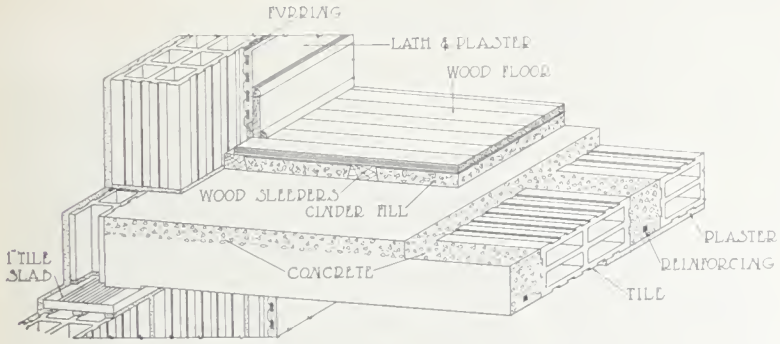


Fig. 953

One Way Combination Floor

The size of reinforcing rods and thickness of floor depend upon the span and load carried. Complete information and tables on floor construction are given in the Association Floor Folder, Serial No. 229.

In the illustration above, a one way combination hollow tile floor with reinforced concrete joist is shown. This is a light, yet strong method of designing a floor slab. This form of construction, besides being economical in centering, offers the advantages of a flat ceiling for plastering direct to the tile and concrete without the application of lath and, in roof construction particularly, freedom from condensation.

This type of floor is particularly adapted to all classes of buildings where medium or long span fireproof floors are required without intermediate or cross beams showing in the ceiling. Hollow tile in combination with concrete, reduces the dead load of the floor slab and provides an excellent plastering surface.

In the home, the one way combination hollow tile floor, in addition to its fire proofing quality, makes a dust proof barricade between the coal bin and the living quarters above. There is also the assurance that in case of fire breaking out in the boiler room it cannot spread through the floor to the rooms above.

Fig. 994-A

Showing use of brick for 2nd story belt course and window sills in wall of Hollow Building Tile. Stucco will finish up under and down on to brick course.

Fig. 994-B

Porch built of Hollow Tile on concrete pier foundation. Note the reinforced beam formed of Hollow Tile carrying the wall and floor construction. These beams are constructed same as lintels shown by Fig. 911, page 38.

The Necessity for Good Flashing

Wherever a roof over a porch or a lower gable roof comes in connection with hollow tile walls, flashing must be provided for.

Sheet lead or copper makes a very desirable flashing although heavy gauged galvanized iron, if well taken care of, and kept well painted will answer the purpose.

This flashing should extend up the tile wall at least 6″ or up to and into the first horizontal joint and should then be brought down over the shingle roof or prepared roof at least 6″, as shown in Fig. 940 and 941, page 42.

This will make a permanent water tight joint as long as the flashing lasts which, in the case of sheet lead, and copper is indefinitely; but in the case of galvanized sheet iron care must be taken to keep the exposed surface well painted.

Standard Window Openings

The following table of glass sizes may be used to the best advantage, so as to avoid excessive cutting of the hollow tile.

The size of the sash opening will be 4″ wider and 6″ higher than the glass sizes for double hung windows and 4″ wider and 5″ higher for casement windows.

DOUBLE HUNG WINDOWS

Glass Size	Sash Opening	Exposed Tile Opening	Stuccoed Tile Opening
16x26	20x58	24x62	25½x63½
28x26	32x58	36x62	37½x63½
34x26	38x58	42x62	43½x63½
42x26	46x58	50x62	51½x63½

CASEMENT WINDOWS

Glass Size	Sash Opening	Exposed Tile Opening	Stuccoed Tile Opening
20x24	24x29	28x33	29½x34½
20x42	24x47	28x51	29½x52½
20x56	24x61	28x65	29½x66½

CELLAR WINDOWS

20x14	24x19	28x23	29½x24½
30x14	34x19	38x23	39½x24½
42x14	46x19	50x23	51½x24½

NOTE: 2″ has been allowed between the back of the staff bead and the inside of the frame for exposed openings. An additional ¾″ has been added all around for stuccoed openings.

Window Sills

Outside window sills may be formed of sill tile or of a course of 3″ or 4″ thick Hollow Tile laid flat and finished in stucco, or of brick on edge, or sawed stone, or cast concrete.

In walls of farm buildings that are built of 8 x 5 x 12 tile laid flat outside window sills are frequently omitted, the window frame being set sufficiently close to face of wall so that the wood sill will project a little beyond face of tile.

In setting brick, concrete or sawed stone sills on Hollow Tile walls that are to be stuccoed, an ample projection from the face of wall should be allowed so that they will have a projection of at least ¾″, preferably a full inch beyond the face of finished stucco wall.

Caulking of Frames

A great many architects prefer to have all window frames caulked in order to eliminate all chance of air leakage around window frames. In some instances caulking is more necessary for another purpose, that of preventing water from penetrating through the wall around back of frames, during driving rainstorms.

Sometimes in cases where dampness has been noted on the wall around windows the blame has been placed on the Hollow Tile, whereas it was due solely to poor workmanship in setting the window frames and ceased to occur when the frames were made tight.

Wood frames will shrink somewhat and caulking undoubtedly improves any building and is recommended in all northern sections of the country, although this is not the usual practice in ordinary residence and commercial work.

If caulking is to be properly done, a groove for it should be provided, as it cannot be well done in cracks that are so narrow the caulking material can be forced in only with the edge of a knife.

Reference to the window frame details shown in the various cuts indicate that provision for caulking has been made in each case and it may be included or omitted without changing any of these details.

The method of frame anchorage and very effective wind stop recommended makes caulking less necessary than when frames are set in the ordinary way.

When caulking with oakum, use the oakum dry. If soaked in oil or other substance containing grease, it will stain the stucco.

Dairy Barn Windows

Note carefully the window and door frame details shown on pages 38 to 41, inclusive.

All frames for use in Hollow Tile walls should have strips nailed on the back in the manner shown.

This generally permits the use of standard stock frames and provides a wind-stop as well as an anchorage for the frames.

When the walls are to be finished with stucco, this stripping also serves to block out the frames to properly allow for the stucco.

No other detail for plank frames such as are used in barns and other farm buildings possess all these advantages.

The best type of windows for dairy barns is a single sash window set flush with the inside of wall and hinged at the bottom, with galvanized iron, cheeks or wind shields mounted on the sides of frame (Fig. 954B.)

Fig. 954-D

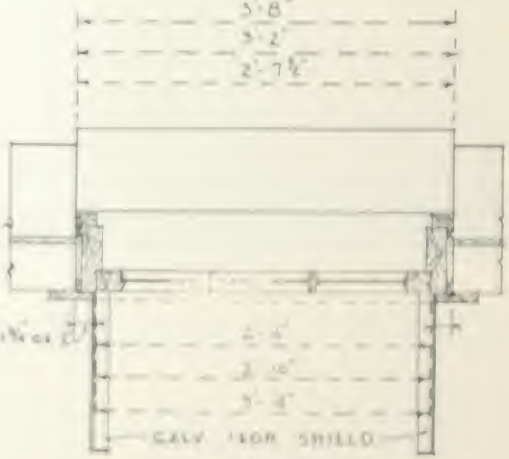


Fig. 954-B

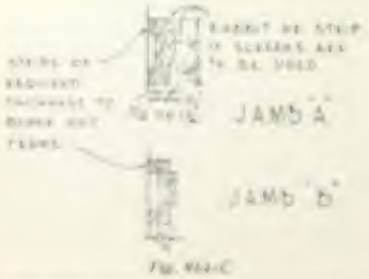


Fig. 954-C

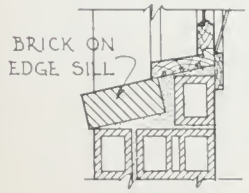
The sill attached to frame should always be made of 2" plank and the outer sill may also be of plank or of brick on edge, as shown by alternate Section "A", page 59.

Window details shown by Fig. 954B are frequently used in Hollow Tile walls, but are not recommended for poultry houses, garages, and other such buildings having tile walls only 4" or 6" in thickness. This is a typical frame wall detail that is not particularly adapted to masonry walls.

In order to avoid cutting tile the most appropriate sizes of sash are as follows:

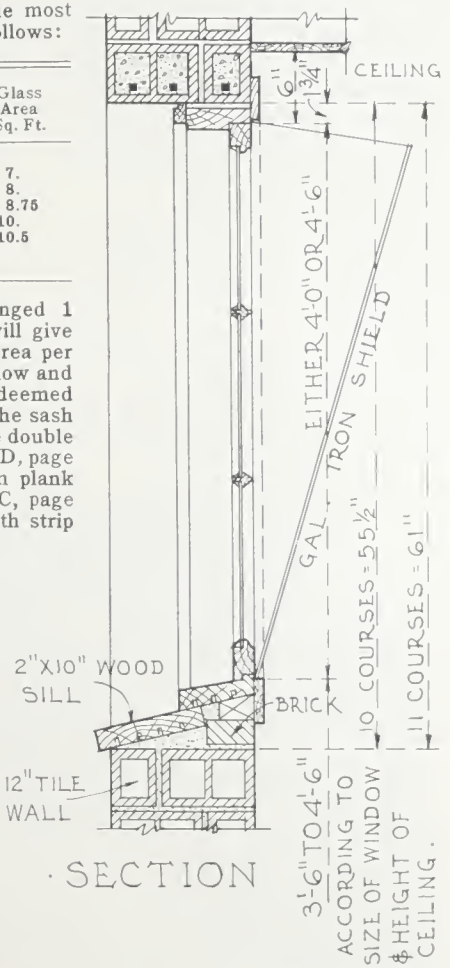
	Overall Size Sash Inches	Glass Area Sq. Ft.
9 Light 8′ x 14′ glass..	28 x 48	7.
12 Light 8′ x 12′ glass..	28 x 54	8.
9 Light 10′ x 14′ glass..	34 x 48	8.75
12 Light 10′ x 12′ glass..	34 x 54	10.
9 Light 12′ x 14′ glass..	40 x 48	10.5
or similar sizes of 1 or 2	light sash.	

All but the first size if arranged 1 window to each two cow stalls will give from 4 to 5 square feet of glass area per animal. This is a good rule to follow and gives the lighting area that is deemed necessary by dairy authorities. The sash in cold northern climates should be double glazed as shown in illustration 954-D, page 58. Frames are best made from plank as shown by jamb "A" Fig. 954-C, page 58, but may be of 7/8" boards with strip nailed on as shown by jamb "B."



·SECTION·

Fig. 954-A



·SECTION·

Fig. 954

Section through window showing type of window frame required and galvanized iron cheeks or wind shields mounted on the side of frame.

Feeding Floors for Hog Houses

In making the plans for a hog house, a feeding floor of Hollow Clay Tile with cement surface should be provided. This floor should be built in sections about 10 feet square and may consist of only two such sections at first, and be increased in area by adding sections as the herd increases.

Feeding floors should be located on the south or east side of the hog house or corn crib so as to be protected from cold winds, and the location should be well drained.

The floor should have a slope of about $\frac{1}{4}$" per foot in one direction away from the buildings.

The finished surface should be made with a wood float, *not with a steel trowel,* so that a gritty surface is obtained that will prevent slipping.

A curb along the sides of feeding floor will prevent the waste of grain and is advisable. This will also prevent the hog from rooting underneath the edges of floor.

The best type of floor for the inside of a hog house is also built of Hollow Clay Tile with cement finish.

Lay a bed of cinders, sand or gravel 4" to 8" in thickness which should be carefully levelled off, wetted and thoroughly tamped; spread over this a coat of cement mortar about $\frac{1}{2}$" thick into which, bed the tile which may be of any thickness, 4", 5", or 6". On this, lay the tile so as to break joints between the rows by using half length tile at ends in alternate rows. Tile should be laid as closely as possible and any broken corners turned down so that

Fig. 968

This illustration shows method of laying a hog house feeding floor. The tile are laid flat closely together upon a 4" sand gravel or cinders mat, and a mixture of one part cement and three parts sand spread to a thickness of at least 1" over the entire area. This forms a permanent and dry floor for hog feeding Broken tile have been set in the ground against a plank to form the curb. The cement grout will fill up the tile curb making a permanent wall.

upper surface will retain finish coat without much leakage of the mortar. The finish coat of Portland Cement and sand is then spread over the tile with a straight edge and when it has settled thoroughly and the surplus water absorbed into the tile should be finished with a wood float. The finish coat should be at least 1 inch in thickness, but need not be over 1½ inch in any case.

Sometimes this method of laying is varied by omitting the under coat of cement mortar and bedding the tile in a damp proofing course of asphalt or tar composition spread over the cinders, sand or gravel.

Hog House Fenders

Fenders are very important and should always be installed. They prevent the sow from crushing the little pigs against the wall when she lies down. Because of the fender the pigs are only shoved under the protecting rail and can easily get out and around to the front of the sow.

Detail for attaching Fender to Hollow Tile walls is shown by Fig. 957.

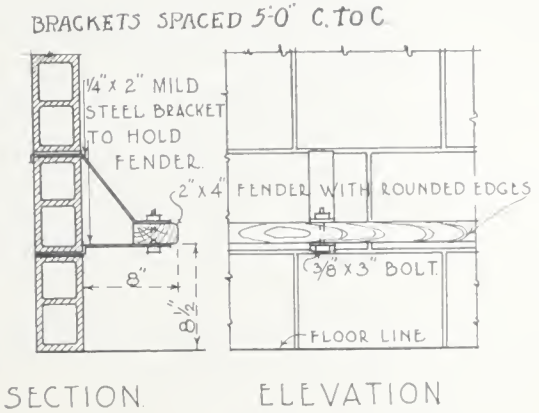


Fig. 957
Details showing method of anchoring fenders in hog pens to hollow tile walls.

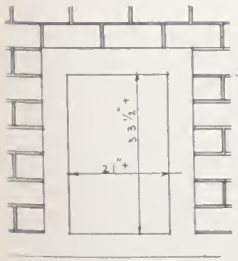


Fig. 958

Hog House Doors

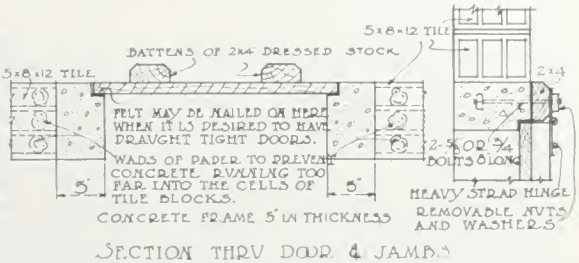


Fig. 958-A

Hog House Doors

Specifications for Hollow Clay Tile for Use in Exterior Walls

Hollow Tile shall be uniform, straight, free from objectionable cracks and be manufactured in such a manner and burned to such a degree of hardness that it will have an average absorption of not over 16% by the one hour boiling test and develop an average ultimate crushing strength of not less than 700 pounds per square inch gross area, when designed to be laid in the wall with the cells horizontal and 1400 pounds per square inch gross area when designed to be laid in the wall with the cells vertical.

NOTE:—Exposed Wall Tile:—Smooth face tile or other tile for use in exterior walls without stucco finish should be specified to have an absorption of not over 12 per cent by the one hour boiling test.

NOTE:—Foundation Tile:—Tile for use in foundation walls in saturated soil or where constantly subjected to sub-surface water and the action of frost should be specified to have an absorption of not over 10 per cent.

All absorption tests to be made by the one hour boiling test.

Standard load-bearing Hollow Tile sizes and weights shall conform to the A. S. T. M. Specifications for Load-bearing Hollow Clay Tile.

Hollow Tile Cellar Floors

Cellar floors built of hollow tile with a 1″ top coat of a 1 to 3 mixture of cement and sand make an ideal form of floor construction. A good hard burned 4x12x12 or 8x5x12 tile may be used for this purpose. The tile are laid flatwise directly upon the leveled-off dirt floor. Second grade material may be used for this purpose, as small imperfections have no bearing on the quality of the floor. The function of the tile is to provide an air space underneath.

With a good hard burned tile it is an actual fact that the lower part of the tile may lay in a saturated soil or in water and yet the top coat will be comparatively dry.

Since any cellar is only as dry as its basement floor, it is evident that the Hollow Tile floor is the best way to obtain a dry basement.

By referring to page 60, which shows the construction of a hog house feeding floor, you may see how the Hollow Tile cellar floor should be laid.